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Eastern Mediterranean Health Journal

IS the official health journal published by the Eastern Mediterranean Regional Office of the World Health Organization. It is a forum for the presentation and promotion of new policies and initiatives in public health and health services; and for the exchange of ideas, concepts, epidemiological data, research findings and other information, with special reference to the Eastern Mediterranean Region. It addresses all members of the health profession, medical and other health educational institutes, interested NGOs, WHO Collaborating Centres and individuals within and outside the Region.

المجلة الصحية لشرق المتوسط

هي المجلة الرسمية التي تصدر عن المكتب الإقليمي لشرق المتوسط بمنظمة الصحة العالمية. وهي منبر لتقديم السياسات والمبادرات الجديدة في الصحة العامة والخدمات الصحية والترويج لها، ولتبادل الآراء والمفاهيم والمعطيات الوبائية ونتائج الأبحاث وغير ذلك من المعلومات، وخاصة ما يتعلق منها بإقليم شرق المتوسط. وهي موجهة إلى كل أعضاء المهن الصحية، والكليات الطبية وسائر المعاهد التعليمية، وكذا المنظمات غير الحكومية المعنية، والمراكز المتعاونة مع منظمة الصحة العالمية والأفراد المهتمين بالصحة في الإقليم وخارجه.

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Editorial

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The Eastern Mediterranean Health Journal examines a diverse number of topics in this issue that underpin public health-related activities in the Eastern Mediterranean Region (EMR), including research methods, communicable disease prevention, drug administration, and palliative care. In fact, the EMR continues to have some of the most pressing public health challenges brought about by social conflict and health systems degradation, exacerbated by natural disasters, including desertification, floods, earthquakes, and soil erosion.

The issue of non-adherence to medication schedules by patients is a topic that receives relatively little attention, yet its observation highlights the added healthcare costs through poor clinical outcomes and higher hospitalization rates. An example of non-compliance with prescribed medication is examined in the article “Adherence to levothyroxine among patients with hypothyroidism in Lebanon” (1), with particular relevance to the growing number of cases of thyroid-related pathologies in the Region. Still, if patients are failing to follow prescriptions from their physicians diligently, then this is not helped by irrational prescription of antibiotics by some physicians, which may result in antibiotic resistance, an issue examined in the article “Practice implications of an antimicrobial stewardship intervention in a tertiary care teach hospital, Qatar” (2).

The article “Agenda setting analysis for maternal mortality reduction: exploring influential factors using Kingdon’s Stream Model” (3) is a comparative study that analysed the agenda setting process in nine successful countries that achieved MDG 5, looking at similarities and differences in the agenda setting process, and concluded that political stability and commitment are core to its success. Continuing the theme of maternal

(and paediatric) mortality is the article “Human development index, maternal mortality rate and under 5 years mortality rate in West Asian countries, 1980–2010: an ecological study” (4), which covers a wider geographic region and compares indices over a 30-year period.

Public health and environmental factors are examined from two points of view in this issue; first, a therapeutic approach to wheezing among pre-school children through possible benefits of vitamin D supplements, as outlined in the article “Serum 25-hydroxyvitamin D status and wheezing in pre-school children, Kuwait” (5). Second, the implementation of proper waste management practices in hospitals to prevent landfill hazards to local populations, is the focus of the article entitled: “Field lessons in surveying healthcare waste management activities in Pakistan” (6).

Finally, the importance of effective nursing practices is addressed through adaptive research methods using Arabic data collection tools, as described in the article “The translation and cultural adaptation validity of the Actual Scope of Practice Questionnaire” (7). The theme of nursing and effective geriatric palliative care is continued in the article “Pain characteristics of older residents in Iranian nursing homes” (8), where the importance of pain management strategies to improve quality of life in older persons is emphasized.

Looking forward, the April issue of the Eastern Mediterranean Health Journal will examine the controversial issue of female genital mutilation in Sudan, gender-based violence in India, tackling communicable diseases as part of disaster management in the Islamic Republic of Iran, and disease screening of migrants arriving in Europe, among other issues of public health interest.

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Adherence to levothyroxine among patients with hypothyroidism in Lebanon

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Abstract

Background: Non-adherence to medication schedules by patients with chronic illnesses can have serious consequences, including poor clinical outcomes, higher hospitalization rates, and increased healthcare costs. Hypothyroidism is a chronic illness with simple treatment, yet non-compliance is common.

Aims: This study aimed to evaluate treatment adherence to levothyroxine therapy in Lebanese population by estimating the proportion of adherent hypothyroidism patients and assess factors affecting the adherence to treatment.

Methods: A cross-sectional survey between May and July 2015 included 337 patients. Patients were approached by a community pharmacist during their visit to buy their levothyroxine drug and were asked to fill the questionnaire.

Results: Among these patients, 14.5% showed high adherence, 30.6% medium adherence, and 54.9% low adherence to medication. The mean adherence score was 5.53 ± 1.86 points. The results of a logistic regression showed that age (ORa=1.036), visiting the endocrinologist once every month (ORa=2.777), and the fact that the physician gave the patient information about the disease (ORa=2.898) would significantly increase the adherence to the medication. In addition, having one (ORa=0.365) or two comorbidities (ORa=0.232) in addition to hypothyroidism, postponing/cancelling medical appointments at the last minute (ORa=0.358), the number of waterpipe smoked per week (ORa=0.621) and the number of alcohol glasses drunk per week (ORa=0.631) would significantly decrease the adherence score.

Conclusion: Educational programmes should be implemented, doctor-patient and pharmacist-patient relationship could be improved and new treatment regimens be considered in order to enhance patient adherence.

Keywords: medication adherence; hypothyroidism; levothyroxine; adherence score; Lebanon.

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Introduction

Hypothyroidism is believed to be an important health issue in Lebanon, as it is worldwide. Studies in India have found a prevalence of hypothyroidism of approximately 11% (1) and 3.05% in Europe (2). According to a recent study conducted by Zreik and Nasralla, the prevalence of hypothyroidism in Lebanon was estimated at 0.6% (3).

Medication adherence is defined by the World Health Organization (WHO) as “the degree to which the person’s behaviour corresponds with the agreed recommendations from a healthcare provider” (4), with respect to timing, dosage, and the frequency of medication-taking during the prescribed length of time (5). Non-adherence is a major cause of treatment failures. Adherence is simultaneously affected by multiple factors. There are five interacting dimensions of non-adherence: healthcare system/team factors such as the access to care and the stress of healthcare visits; patient-related factors especially psychological factors; therapy-related factors that comprise the unpleasant side-effects; condition-related factors such as the duration of therapy; and finally

social and economic factors that include unstable living conditions, lack of family or social support, medication cost, and health insurance (6).

Adherence to therapy may be investigated by direct patient report, clinical impression or frequency of refills at the pharmacy. Non-adherence to medication schedules by patients with chronic illnesses has long been recognized as a problem. It is estimated that approximately only 50% of patients follow treatment recommendations (7). Hypothyroidism is a chronic illness with simple treatment, yet non-compliance is common. Little objective information is available about patient adherence to hypothyroidism medications, although most clinicians believe non-adherence is common. Estimates of non-adherence range from 22% to 82% of patients (8). A study done in the United States of America in 2008 showed that during the first year of drug therapy, 68.4% of individuals with hypothyroidism achieved adherence rates of 80% or better (7).

Since data about hypothyroidism in Lebanon are scarce, the major objective of this study is to evaluate

treatment adherence to levothyroxine therapy in a sample of the Lebanese population. Our study's secondary objectives were to investigate the knowledge of these patients about their disease and therapy and to assess factors affecting their adherence to treatment. Knowing these factors (comorbidities, cost of medicine, interaction with food or medication and patient's education) will provide a comprehensive knowledge for healthcare providers in order to improve medication adherence.

Methods

Study design and sampling

A pilot cross-sectional survey was carried out using a sample of Lebanese patients. Patients were approached by a community pharmacist during their visit to buy levothyroxine drug at community pharmacies. Before the start of the data collection process, all community pharmacists received a common training with the research team in order to ensure consistency. The pharmacist explained the study objectives to each patient. We had to obtain the permission of the pharmacist in charge in order to fill the questionnaires in his/her pharmacy. After a period of 12 weeks, questionnaires were placed in closed envelopes and collected from the pharmacies for data entry. The names of the patients were registered to ensure non-duplication of the same patient, but not entered in the database to ensure anonymity. The anonymity of the patients was guaranteed during the data collection process in order to avoid information bias. The study was performed over a period of 12 weeks between May and July 2015. The sample included patients from 22 pharmacies from four districts in Lebanon (Beirut, Mount Lebanon, North and South Lebanon).

Compliance with ethical standards

The Lebanese University Institutional Review Board waived the need for an approval based on the facts that it was an observational study that respected participants' autonomy and confidentiality and induced minimal harm to them. A written informed consent was obtained from all participants prior to distributing the questionnaire to them.

Inclusion and exclusion criteria

Eligible patients were Lebanese adults older than 18 years old, treated with any levothyroxine drug available in the Lebanese market for hypothyroidism since at least six months, regardless to other medicines that may be taken by the patient for the treatment of co-existing medical conditions. There were not any specific exclusion criteria except mental illness or dementia, which could affect the participant's ability to understand and answer properly the questionnaire and cause information bias. Patients assisted by a caregiver were not eligible to participate because they were not in charge of their own adherence to treatment.

Sample size

We fixed our expected frequency of adequate knowledge

at 68.4% in a similar study (7) and chose a precision level of $\pm 7\%$. The Epi-info software version 7.2 (a population survey) calculated a minimum sample size of 332 to ensure a confidence level of 95%.

Data collection

Data were collected by using a well-designed questionnaire composed of different sections. These sections were chosen and organized based on the review of similar literature. The participants completed the self-administered anonymous questionnaire in the Arabic language. First, it was pilot-tested on nine patients for further modifications who were not included in the final study sample. This was done to check the questions were unambiguous and easily understood by the patients and that it was possible to complete in an appropriate time frame. The questionnaire which consisted of closed and open-ended questions was completed by the patients in an average time of 7 minutes.

The questionnaire

In order to explore the views of a representative sample, the study questionnaire was designed to facilitate the collection of quantitative as well as qualitative data. The questionnaire used in this study had several parts, starting with numerous questions related to the socio-demographic characteristics of the patients such as age, gender, profession, marital status. The second part was about lifestyle characteristics and comprised of questions about cigarette and waterpipe smoking and their respective number of cigarettes/waterpipes smoked per day, alcohol and coffee drinking with the quantities consumed respectively, regular physical activity with the duration of exercise done per week and sleeping hours. The third part was about the general medical condition and included the thyroid drug taken by the participant with regards to timing, dosage, and frequency of medication-taking. The fourth part was specifically about thyroid problems, and included questions about the cause of hypothyroidism, starting and a secondary dose of treatment and the frequency of Thyroid Stimulating Hormone (TSH) and Free Thyroxine (FT4) testing. The fifth part aimed to collect data on the relationship with the healthcare provider based on the frequency of the patient's visits to his doctor, and the education that the patient has received from his doctor/ pharmacist regarding his disease and treatment.

The following part was to elicit the information that the patients had about the importance of iodine intake for normal thyroid function. The adherence to thyroid drugs was assessed by asking the patients about the frequency, percent and rating response of their levothyroxine medication during the last month.

Concerning the frequency, we asked the patient "did you take all your medications all the time?" with the possible responses being divided as follow: 0% for none of the time, 20% for a little of the time, 40% for some of the time, 60% for a good bit of the time, 80% for most of the time and 100% for all the time. The percent item was checked using the question "what percent of the time

were you able to take your medications exactly as your doctor prescribed them?” The rating item was assessed using the following question “rate your ability to take all your medications as prescribed” with the possible answers being divided as follows: 0% = very poor, 20% = poor, 40% = fair, 60% = good, 80% = very good and 100% = excellent. The total score was calculated by summing all three answers and presented in a percentage (9–11). The total score obtained could be presented as a percentage (9–11).

Statistical methodology

Statistical analysis was performed using SPSS software version 21. Descriptive statistics, mainly mean values and standard deviation (SD), were presented for continuous quantitative variables, while frequencies and percentages were used for nominal and ordinal variables. We checked the distribution normality for all variables using the Shapiro Wilk test. Student’s t-test was conducted to examine differences between means in quantitative variables, while Chi-square analyses were used to compare qualitative and some categorical variables. ANOVA test

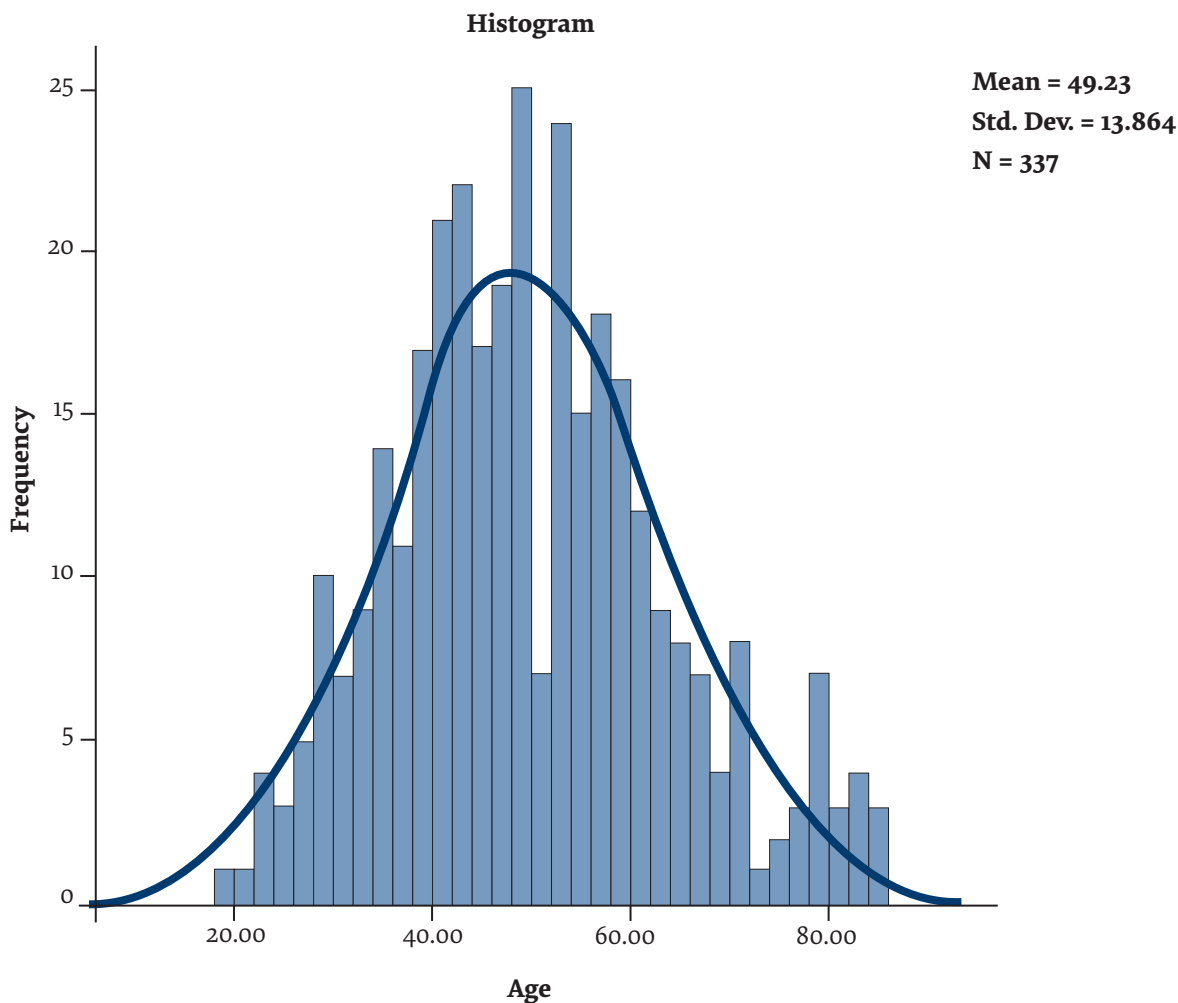
was used to compare between means of three or more groups. The correlation coefficients were used to evaluate the association between quantitative variables. $P < 0.05$ was considered significant.

Association between multiple factors including socio-demographic characteristics of study participants and adherence were evaluated, using both bivariate and multivariable analysis. A multiple logistic regression was carried out using variables that showed a $P < 0.2$ in the bivariate analysis (12,13); potential confounders may be eliminated only if $P > 0.2$, in order to protect against residual confounding (14). In the multiple logistic regression, the dichotomized adherence score (based on a cutoff point = 60%) was used as the dependent variable. Significance was defined as a $P < 0.05$.

Results

Out of the 450 distributed questionnaires, 337 (75%) were filled and returned back. Thus, the sample size needed for sufficient power to conduct the analysis was met. Our sample was normally distributed, with a P-value of the Shapiro Wilk test of 0.263 and as shown in Figure 1.

Figure 1 Normal distribution of sample



Descriptive analysis

Socio-demographic characteristics

Table 1 describes the socio-demographic and socio-economic characteristics of the 337 participants. The mean age was 49.23 ± 13.86 years and the mean Body Mass Index (BMI) was 25.98 ± 4.36 kg/m². Females' participation (75.7%) was higher than that of males (24.3%) and the highest percentage of the patients lived in Mount Lebanon (59.6%). Almost 37% of these patients had a university degree while 7% were not educated and 36% had no professional work. The monthly income of the house was mostly between LEB£ 1000 000 and 2 000 000 (42.4%) and only 5% of the patients reported living alone. Among the 337 study participants 15% did not have any medical insurance coverage, while 42% benefited from the National Social Security Funds (NSSF) and 29% had a private health insurance.

Lifestyle characteristics

Lifestyle characteristics and social habits of the study participants were presented in Table 2. 42.1% of the patients were cigarette smokers whereas 21% reported waterpipe smoking. Coffee drinking was proclaimed by the majority (90.8%) unlike alcohol drinking that was reported by only 44% of the participants. Among these patients, only 27% practiced a regular physical activity.

Health status and medication-related characteristics

Concerning the medical situation, Table 3 shows that more than half of the patients (56.7%) did not have a family history of hypothyroidism. Responses to the questions that aimed to reveal the manner in which Lebanese population took thyroxine drug showed that almost all patients (98.5%) took their levothyroxine medicine in the morning and 91% declared taking it before meals whereas only 49% reported taking this medicine away from food. Out of the 337 participants, 39% experienced a better medication adherence after the dose was increased while 58% maintained the same adherence rate.

Some of the surveyed patients suffered only from hypothyroidism (26.7%) but a higher proportion (44.5%) had one additional medical problem and 28.8% were suffering from at least two co-morbidities. The mean number of medicines taken by these patients was 2.83 ± 1.82 drugs, while the mean duration of hypothyroidism reported was 9.71 ± 7.52 years. Among this sample, 61% of the patients professed a regular testing of their thyroid function with a mean testing frequency of 9.35 ± 3.76 months and 64% of them obtaining normal results. Only 22% of these patients admitted knowing the normal range of TSH.

Relationship with a healthcare provider and knowledge of the importance of iodine supplementation

The highest frequency of endocrinologist's regular visit was the yearly visit (39.8%) and 26% of the participants admitted consulting their physician less than once per year. The majority of the patients (94.1%) revealed that their doctor/ pharmacist gave them the necessary explanation

Table 1 Socio-demographic and socio-economic characteristics

Factor	Mean \pm SD/ N (%)
Age	49.23 \pm 13.86 years
Gender	
Male	82 (24.3)
Female	255 (75.7)
Weight (kg)	71.31 \pm 13.83
Height (m)	1.65 \pm 0.07
BMI (kg/m ²)	25.98 \pm 4.36
Region	
Beirut	95 (28.2)
Mount Lebanon	201 (59.6)
North	10 (3)
South	31 (9.2)
Education	
Primary	14 (4.2)
Complementary	73 (21.7)
Secondary	103 (30.6)
University	123 (36.5)
Not Educated	24 (7.1)
Employment status	
Unemployed	120 (35.6)
Employee/Liberal	208 (61.7)
Retired	9 (2.7)
Monthly income	
Less than 1M	117 (34.7)
Between 1M and 2M	143 (42.4)
More than 2M	77 (22.8)
Live alone	
No	320 (95)
Yes	17 (5)
Medical coverage	
Cash payer	51 (15.1)
NSSF	141 (41.8)
Mutual fund of civil servants	37 (11)
Army	6 (1.8)
Security forces	4 (1.2)
Private Insurance	98 (29.1)

about the way they should take their medicine while only 45% stated having enough information about their case and medicines. However, more than half of the participants (53%) admitted postponing medical appointments and in the case of only 29% of the patients, the doctor recommended a special diet for iodine supplementation, rich in sea food and iodized salt. The knowledge of the importance of iodine supplementation in hypothyroidism was

Table 2 Lifestyle characteristics and social habits

Factor	N (%)
Smoking	
No smoking	124 (36.8)
Cigarette	142 (42.1)
Waterpipe	71 (21.1)
Current alcohol drinking	
No	190 (56.4)
Yes	147 (43.6)
Current coffee drinking	
No	31 (9.2)
Yes	306 (90.8)
Regular physical activity	
No	246 (73)
Yes	91 (27)

somehow good since almost 24% of the participants admitted that iodized salt is the main source of iodine and 54% of them knew that seafood is a significant source of this element. However, only 59% of the participants were aware that thyroid gland needs iodine for normal production of hormones and 44% of them declared not knowing the negative outcomes of iodine deficiency (Table 4).

Adherence patterns

Results revealed that 49 (14.5%) patients were classified into the High Adherence group, 103 (30.6%) were identified into the Medium Adherence group and 185 (54.9%) into the Low Adherence group. The mean adherence score was 5.53 ± 1.86 . The score reliability was satisfactory, measured with Cronbach Alpha the given result was 0.7, which reflects a good internal consistency.

Statistical analysis

Bivariate analysis for the factors associated with the medication adherence

The results of the bivariate analysis showed that a significantly higher mean adherence score was found in retired patients (6.56 ; $P = 0.008$) compared to unemployed or employed patients; in those who schedule physician visits once every 2 months (7.15 ; $P < 0.001$); patients regularly testing their TSH ($P < 0.001$), who know the normal range of TSH ($P < 0.001$); and those who do not postpone their doctor's visit ($P < 0.001$). In addition, a significantly lower mean adherence score was found in patients with one comorbidity compared to those without comorbidities ($P = 0.002$) (Table 5).

Moreover, a significant and positive correlation was found between the adherence score and age ($r = 0.155$; $P = 0.004$), mean duration of hypothyroidism ($r = 0.144$; $P = 0.008$), whereas a significant negative correlation was found between the number of waterpipe smoked per week ($r = -0.115$; $P = 0.035$) and the number of alcohol glasses drunk per week ($r = -0.227$; $P < 0.001$) (Table 6).

Multivariate analysis

The results of a logistic regression showed that age (ORa = 1.036), visiting the endocrinologist once every month (ORa = 2.777), and the fact that the physician gave the patient information about the disease (ORa = 2.898) significantly increased the adherence score. In addition, having one (ORa = 0.365) or two comorbidities (ORa = 0.232) in addition to hypothyroidism, postponing/cancelling medical appointments at the last minute (ORa = 0.358), the number of waterpipe smoked per week (ORa = 0.621) and the number of alcohol glasses drunk per week (ORa = 0.631) significantly decreased the adherence score (Table 7).

Discussion

In this study of adult Lebanese patients suffering from hypothyroidism, we estimated the prevalence of non-adherence to levothyroxine therapy and we investigated the factors affecting this behavior and preventing good medication adherence. The overall percentage of non-adherent patients was 54.9%, greater than that reported adherence rate in Manchester, United Kingdom (22%) (15) and the United States of America (31.6%) during the first year of drug therapy (7). The true prevalence of non-adherence with levothyroxine therapy will be much higher than the self-reported non-adherence. Such questioning has a low sensitivity (55%) for ruling out non-adherence (16).

Older patients and males were found to be less adherent according to our results, while a study comparing adherence rates among seven different medical conditions including hypothyroidism, showed that in the comparison of adherence by gender, adherence rates showed little variation. In contrast, adherence rates considerably improved with increasing age particularly in hypertension, type 2 diabetes and hypothyroidism (7). This might be due to a lack of communication between the healthcare professional and the patient (17). Furthermore, with increasing age, subjects tend to have compromised physical dexterity, cognitive skill, and memory (18).

Patients having at least one or more additional medical problem had a worse adherence compared to those suffering only from hypothyroidism. Conversely, a study comparing adherence rates of subjects with hypothyroidism found that the influence of comorbidity burden was small (7). In addition, patients were more likely to achieve higher levels of adherence if their monthly income increased, which is understandable since high-income people can afford to pay for their medications as compared to low-income people. This is similar to findings of a study done in the United States of America (7). As a consequence, it is assumed that any governmental or private health plan policy that reduces copayments would enhance medication adherence (7). In Lebanon, the National Social Security Funds reimburses 80% of the price of the levothyroxine medications, whereas some private insurances have plans which cover medications.

Postponing the physician's visits had in this study the greatest impact on adherence score by decreasing

Table 3 Health status and medication-related characteristics

Factor	Mean ± SD/ N (%)
Family history	
No	191 (56.7)
Parents	94 (27.9)
Siblings	52 (15.4)
Timing of medication intake	
Morning	332 (98.5)
Not in the morning	5 (1.5)
Intake of drugs concerning the meals	
Before meals	308 (91.4)
After meals	29 (8.6)
Intake of drugs away from food	
No	169 (51.1)
Yes	162 (48.9)
Better adherence after dose increase	
No	13 (3.9)
Yes	130 (38.6)
Same adherence	194 (57.6)
Presence of comorbidities	
No comorbidity	90 (26.7)
One comorbidity*	150 (44.5)
2+ comorbidities**	97 (28.8)
Duration of hypothyroidism (in years)	9.71 ± 7.52
Number of medication taken	2.83 ± 1.82
TSH test regularly	
No	132 (39.2)
Yes	205 (60.8)
Period of testing (months)	9.35 ± 3.76
Result of testing***	
Normal	215 (63.8)
Not normal	28 (8.3)
Don't know	94 (27.9)
Knowing the normal range of TSH	
No	263 (78)
Yes	74 (22)

*Patients with one disease.

**Patients with two or more diseases.

***Normal TSH levels defined as a range from 0.4–4.0 milli-international units per litre (mIU/L) (<https://www.nlm.nih.gov/medlineplus/ency/article/003684.htm>).

it significantly. Indeed, many factors of non-adherence were related to patients' education which included unawareness, ignorance, patient's feeling of being fine or not in need of the pills any longer (19). Those factors are all potentially preventable and health providers should do their best to correct them by educating their patients about their treatments (19).

Following surgery, levothyroxine non-compliance is a common problem even in high income and well-educated societies (19). Schifferdecker et al. had shown that following thyroidectomy, 17% of German patients

Table 4 Description of factors related to the healthcare provider and patient's knowledge about the disease

Factor	N (%)
Frequency of physician's visit	
Monthly	11 (3.3)
Once every 2 months	5 (1.5)
Once every 3 months	21 (6.2)
Once every 6 months	78 (23.1)
Once per year	134 (39.8)
Less than once per year	88 (26.1)
Physician's explanation	
No	20 (5.9)
Yes	317 (94.1)
Do you think you have enough information about the disease?	
No	187 (55.5)
Yes	150 (44.5)
Postponing / cancelling medical appointments at the last minute	
No	158 (46.9)
Yes	179 (53.1)
Following a recommended diet	
No	240 (71.2)
Yes	97 (28.8)
Main source of iodine	
Iodized salt	80 (23.7)
Seafood	183 (54.3)
Don't know	74 (22)
Which part of the body needs iodine	
Thyroid gland	199 (59)
Don't know	138 (41)
The most negative outcome for iodine deficiency	
Impaired growth	31 (9.2)
Hypothyroidism	157 (46.6)
Don't know	149 (44.2)

decided to stop therapy without the knowledge of their treating physicians (20). The opposite is true according to our study where the bivariate analysis demonstrated that patients having a history of thyroidectomy had a better adherence score, probably because of a better understanding of the consequences of the ablation of the thyroid gland.

In line with earlier reports, having enough information about the medical condition was found to improve the adherence score. In fact, educating the patient about the medication is not enough since a randomized controlled trial of levothyroxine adherence showed that distributing booklets about levothyroxine medication did not improve adherence between the study group and the control group (15,20). The doctor–patient relationship plays a key role in adherence to medication regimens. Physicians who use understandable language and encourage open doctor–

Table 5 Bivariate analysis for the qualitative factors associated with the adherence to medications

Adherence scores / Factor	Total Number N=337 (100%)	Mean adherence score \pm SD	P-value
Gender			0.187
Male	82 (24.3)	5.30 \pm 1.85	
Female	255 (75.7)	5.61 \pm 1.86	
Employment status			0.008
Unemployed	120 (35.6)	5.86 \pm 1.90	
Employee/ liberal	208 (61.7)	5.30 \pm 1.82	
Retired	9 (2.7)	6.56 \pm 1.39	
Monthly income			0.085
Less than 1M	117 (34.7)	5.82 \pm 1.86	
Between 1 and 2 M	143 (42.4)	5.45 \pm 1.85	
More than 2M	77 (22.8)	5.25 \pm 1.84	
Disease status			0.002
No comorbidity	90 (26.7)	5.97 \pm 1.86	
One comorbidity	150 (44.5)	5.15 \pm 1.85	
2+ comorbidities	97 (28.8)	5.72 \pm 1.79	
Frequency of physician visits			< 0.001
Monthly	11 (3.3)	6.48 \pm 1.22	
Once every 2 months	5 (1.5)	7.15 \pm 1.41	
Once every 3 months	21 (6.2)	5.95 \pm 1.35	
Once every 6 months	78 (23.1)	6.21 \pm 1.72	
Once per year	134 (39.8)	5.46 \pm 1.80	
Less than once per year	88 (26.1)	4.74 \pm 1.95	
Testing thyroid function regularly			< 0.001
No	132 (39.2)	4.91 \pm 1.99	
Yes	205 (60.8)	5.94 \pm 1.66	
Has your doctor explained how to take your medication			0.121
No	20 (5.9)	4.71 \pm 2.37	
Yes	317 (94.1)	5.59 \pm 1.82	
Do you think you have enough info regarding your medical condition			< 0.001
No	187 (55.5)	5.14 \pm 1.82	
Yes	150 (44.5)	6.02 \pm 1.81	
History of thyroidectomy			0.182
No	239 (70.9)	5.38 \pm 1.89	
Yes	98 (29.1)	5.65 \pm 1.83	
Do you know the normal range of TSH?			< 0.001
No	263 (78)	5.31 \pm 1.87	
Yes	74 (22)	6.32 \pm 1.61	
Do you postpone the doctor's visit?			< 0.001
No	158 (46.9)	6.16 \pm 1.66	
Yes	179 (53.1)	4.98 \pm 1.86	
Has your doctor advised to follow a diet?			0.068
No	240 (71.2)	5.43 \pm 1.94	
Yes	97 (28.8)	5.81 \pm 1.63	

patient communication in friendly, caring environments are more likely to foster participation by patients in their own medical care, increasing the likelihood of adherence (21).

Poor adherence is the most likely explanation of TSH remaining above the normal range (22). Repeating this test every six weeks is appropriate until the dose is stabilized. However, this time interval can be increased if the patient

Table 6 Correlations between quantitative variable and the adherence score.

Adherence score/ factor	Mean ± SD	Correlation coefficient	P-value
Age	49.23 ± 13.86	r= 0.155	0.004
Mean duration of hypothyroidism	9.71 ± 7.52	r= 0.144	0.008
Number of medication taken	2.83 ± 1.82	r= 0.077	0.158
Number of cigarettes per day	4.03 ± 6.73	r=-.007	0.899
Number of waterpipe per week	0.46 ± 1.11	r= - 0.115	0.035
Number of alcohol glasses per week	0.95 ± 1.36	r= - 0.227	<0.001
Number of cups of coffee per day	2.84 ± 2.04	r=-.015	0.786
Number of exercising times per week	0.78 ± 1.38	r=0.058	0.286
Number of sleeping hours per day	7.08 ± 1.17	r=0.014	0.794

is approaching a euthyroid state and is feeling well. After the dose is stabilized an annual TSH measurement is usually adequate monitoring unless a problem arises (23). Our findings match those of a study done in the United Kingdom in which compliant participants were more likely to have had their TSH checked within the previous 12 months and for their most recent TSH to be within the reference range (24).

Moreover, knowing the normal range of TSH was shown to improve the adherence score. This is consistent with the guidelines of the American Association of Clinical Endocrinologists that suggest during follow-up assessments an appropriate interim history to be recorded, and physical examination to be performed in conjunction with pertinent laboratory tests. Involving the patient in the levothyroxine treatment by explaining the thyroid disease and potential consequences should result in improved adherence (25).

Our study demonstrated that following a recommended diet improved the adherence rate and that the knowledge of the importance of iodine supplementation among the participants was not satisfactory. The knowledge of iodine distribution in nature, its metabolism, its recommended daily allowances and its supplementation will help understand the problems of the thyroid hormones (26).

Health care professionals (physicians and pharmacists) can play an important role in explaining to the patient that iodine cannot be stored for a long period in the body; thus, it must be supplied regularly in the diet (26).

Limitations

This study had several limitations. First, it was designed to be an observational study, relying on the reports made by the participants without independent verification. In addition, given that patients were from four districts of Lebanon, mostly from Mount Lebanon and Beirut, our results may not be extrapolated to the whole Lebanese population suffering from hypothyroidism. Hence, the extent of generalization from this study results is limited. Selection bias might be possible because of the 25% refusal rate. Self-reporting was used as the only method of measuring adherence, which has potential disadvantages concerning recall and information bias and eliciting only socially acceptable responses. However, we did not include any question about depression, which can be a potential factor for non-adherence to medications. Given these possibilities, adherence levels among participants may be overestimated. The study was also limited by the broad inclusion criteria, which permitted the inclusion of patients with a wide variety of conditions resulting in hypothyroidism. However, the use of the broad inclusion

Table 7 Multivariable analysis: Logistic regression taking the dichotomous adherence score (cut-off of 60%) as the dependent variable

Factor	P-value	OR ^a	Confidence Interval	
Age	.028	1.036	1.004	1.068
Disease status*	.025			
One comorbidity	.026	0.365	0.150	0.972
2+ comorbidities	.011	0.232	0.076	0.713
Visiting the endocrinologist once every month	.022	27.777	1.631	42.136
Postponing / cancelling medical appointments at the last minute	.015	0.358	0.156	0.821
Physician explained about the disease	.021	2.898	1.173	7.142
Number of waterpipe per week	.094	0.621	0.356	1.084
Number of alcohol glasses per week	.010	0.631	0.444	0.896

*Compared to no comorbidities

criteria can also be considered as strength, as it allowed the study to reflect the adherence status of the Lebanese.

Conclusion and recommendations

To our knowledge, there are no previous studies analyzing the adherence to thyroxine medication among Lebanese patients suffering from hypothyroidism. Many factors have been identified to affect adherence, either by improving adherence such as higher monthly income, comorbidities, history of thyroidectomy, having enough information about the medical condition, the duration of treatment, regular testing of TSH, knowing the normal range of TSH, following a recommended diet or by decreasing it as though male gender, young age and postponing medical appointments, leading to poor treatment adherence.

We conclude that even though effective drug therapy is available for hypothyroidism. It is challenged by non-

adherence which is a universal problem. The clinical implication of these findings is that patient educational programmes could be implemented in order to increase the awareness about the importance of medication adherence. Furthermore, the doctor-patient relationship could be improved in order to encourage the participation of the patients in their own medical care, increasing the likelihood of adherence. The community pharmacist can have a huge impact on patient adherence by counseling patients and teaching them about the drug-drug and drug-food interactions of thyroid medications and by coaching patients about the consequences of non-adherence. In addition new treatment regimens, such as the once weekly oral levothyroxine, could be considered as an alternative in patients having difficulty to adhere to their life-long daily medication.

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Observance du traitement par lévothyroxine chez des patients atteints d'hypothyroïdie au Liban

Résumé

Contexte : La non-observance des horaires de prises médicamenteuses par les patients atteints de maladies chroniques peut avoir de graves conséquences, tels que de mauvais résultats cliniques, des taux d'hospitalisation plus élevés et une augmentation des coûts de santé. L'hypothyroïdie est une maladie chronique dont le traitement est simple. Pourtant, la non-observance médicamenteuse est courante.

Objectifs : La présente étude avait pour objectif de déterminer l'observance du traitement par lévothyroxine dans la population libanaise en estimant la proportion de patients qui respectent le traitement et en évaluant les facteurs qui affectent l'observance thérapeutique.

Méthodes : Une étude transversale conduite entre mai et juillet 2015 incluait 337 patients. Des patients ont été contactés par un pharmacien communautaire lors de leur visite pour acheter leur traitement et il leur a été demandé de remplir un questionnaire.

Résultats : Parmi ces patients, 14,5 % ont montré une observance élevée, 30,6 % une observance moyenne et 54,9 % une faible observance médicamenteuse. Le score moyen d'observance était de $5,53 \pm 1,86$ points. Les résultats de la régression logistique ont montré que l'âge ($ORa = 1,036$), la visite chez un endocrinologue une fois par mois ($ORa = 27,77$) et le fait que le médecin ait informé le patient de la maladie ($ORa = 2,898$) augmenteraient considérablement l'observance médicamenteuse. De plus, le fait d'avoir une ($ORa = 0,365$) ou deux comorbidités ($ORa = 0,232$) en plus de l'hypothyroïdie, de reporter/d'annuler les rendez-vous médicaux à la dernière minute ($ORa = 0,358$), le nombre de pipes à eau fumées par semaine ($ORa = 0,621$) et le nombre de verres d'alcool consommés par semaine ($ORa = 0,631$) réduiraient considérablement le score d'observance.

Conclusion : Des programmes éducatifs devraient être mis en œuvre, la relation médecin-patient et pharmacien-patient pourrait être améliorée et de nouveaux schémas thérapeutiques devraient être envisagés afin d'améliorer l'observance du patient.

الالتزام بتناول ليفوثيروكسين بين المرضى المصابين بقصور الغدة الدرقية في لبنان

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الخلاصة

الخلفية: يؤدي عدم التزام المرضى الذين يعانون من أمراض مزمنة بمواعيد الأدوية إلى عواقب خطيرة، بما في ذلك ضعف المخرجات السريرية ومعدلات أعلى للدخول إلى المستشفى، وارتفاع تكاليف الرعاية الصحية. ويُعدُّ قصور الغدة الدرقية مرضًا مزمنًا وعلاجه بسيط، ولكن يشجع عدم الالتزام بتناوله.

الأهداف: هدفت هذه الدراسة إلى تقييم الالتزام بتناول دواء ليفوثيروكسين بين السكان اللبنانيين من خلال تقدير نسبة المرضى بقصور الغدة الدرقية الملتزمين وتقييم العوامل المؤثرة في الالتزام بالعلاج.

طرق البحث: أجري استطلاع مقطعي في الفترة بين مايو/ أيار ويوليو/ تموز ٢٠١٥ وشمل ٣٣٧ مريضاً، حيث تحدث الصيادلة المجتمعيون مع المرضى أثناء زيارتهم لشراء دواء ليفوثيروكسين، وطلب منهم ملء الاستبيان.

النتائج: من بين هؤلاء المرضى، أظهر ١٤, ٥٪ التزاماً كبيراً، وأظهر ٣٠, ٦٪ التزاماً متوسطاً، وأظهر ٥٤, ٩٪ التزاماً منخفضاً بتناول الدواء. وكان متوسط درجات الالتزام هو ٨٦ ± ١, ٥٣ نقطة. وأظهرت نتائج الارتباط المنطقي أن العمر ($ORA=1, 036$)، وزيارة أخصائي الغدد الصماء مرة واحدة شهرياً ($ORA=27, 77$)، وحقيقة أن الطبيب أعطى المريض معلومات حول المرض ($ORA=2, 898$) تزيد بشكل كبير من الالتزام بتناول الدواء. إضافة إلى ذلك، الإصابة بحالة مرضية مصاحبة واحدة ($ORA=0, 365$) أو حالتين ($ORA=0, 232$) بالإضافة إلى قصور الغدة الدرقية، وتأجيل/ إلغاء مواعيد الزيارات الطبية في اللحظة الأخيرة ($ORA=0, 358$)، وعدد مرات تدخين النرجيلة (الشيشة) التي تم تدخينها في الأسبوع ($ORA=0, 621$)، وعدد كؤوس الكحوليات التي تم شربها في الأسبوع ($ORA=0, 631$) يؤدي إلى تقليل درجة الالتزام بشكل كبير.

الاستنتاجات: يجب تطبيق برامج للتوعية، ويمكن تحسين العلاقة بين الطبيب والمريض وبين الصيدلي والمريض، كما يمكن البحث في نظم علاج جديدة لتحسين التزام المرضى بتناول الدواء.

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Agenda setting analysis for maternal mortality reduction: exploring influential factors using Kingdon's Stream Model

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Abstract

Background: Maternal mortality is considered as unacceptable death.

Aims: This study aimed to analyse the agenda setting process for maternal mortality reduction policies in nine successful countries in achieving Millennium Development Goal 5 (MDG 5) using the Kingdon's multiple streams theory.

Methods: This comparative study analysed the agenda setting process in nine successful countries which achieved MDG 5. The agenda setting analysed the use of the Kingdon's multiple streams model. To extract similarities and differences in the agenda setting process, the content analysis method, available documents and reports, and the comparative table were used.

Results: The initial attention to the problem of high rate of maternal mortality was different in the studied countries, but MDGs and the countries' official reports were the main driver. Political stability, political will, key person's contribution and legislation were considered influential factors strengthening political stream. International technical or financial support, regional and international conferences, national plans and enabling factors, which provide technical feasibility, were the most important factors influencing the policy stream. Enabling factors included approving regulations and legislation, increased quantity and quality of human resources, organizational structure, service delivery enhancement, infrastructure development, providing medicines and equipment, and strengthening health information system.

Conclusions: The three streams: problem, policy and politics are not separate from each other. Political stability and commitment, having a national plan and benefiting from technical or financial support of international entities was a common feature among almost all the studied countries. The key actions leading to the opening of the window of opportunity were those actions that led to highlighting the problem.

Keywords: Maternal mortality, agenda setting, Kingdon's model, comparative study

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Introduction

Despite the advances made in reducing maternal mortality in recent decades, the elimination of avoidable deaths is considered as a vital concern and an agenda for policy makers (1). The analysis of related policies helps overcome existing defects and select appropriate solutions. In recent years, the use of policy-making models and frameworks in retrospective and prospective analyses of health policies and policy analyses in a systematic way have been published globally (2). One of the prestigious theories is the Kingdon's multiple streams theory. The Kingdon's model addresses how some issues are placed on the agenda (3).

Millennium Development Goals (MDGs) are eight common goals that were adopted in the United Nations by 189 countries in 2000 and should have been achieved by 2015. The fifth goal is maternal health improvement. According to the report 2015, nine countries – Bhutan, Cabo Verde, Cambodia, East Timor, Islamic Republic of Iran, Lao People's Democratic Republic, Maldives, Mongolia and Rwanda were mentioned as successful

countries in achieving MDG 5 of reducing maternal mortality rate (4). This analytical study aims to explore the process of agenda setting for the issue of reducing maternal mortality in these countries using the Kingdon's theory.

Methods

This descriptive-comparative study analyzed the development of agenda setting process of maternal mortality reduction based on the Kingdon's multiple streams model in nine successful countries. Required data that shape the problem, political and policy streams for maternal mortality in selected countries was gathered through reviewing national and international documents and reports published in valid scientific databases and electronic portals such as the World Health Organization (WHO) and upstream documents dated before 2015. Lack of documents about Cabo Verde was the main difficulty in gathering the information, especially since most of the documents were in either French or Spanish. The content analysis method and the comparative table were used to

analyse the data.

The Kingdon's multiple streams theory emphasizes agenda setting and includes three independent streams that when joined together (Figure 1), they open a window of opportunity. The first stream, referred to as problem stream, is related to the problems, issues or challenges that have attracted the attention of society. The second stream, policy stream, addresses the policy options that researchers, stakeholders and executive bodies propose to solve the problem. Political transitions, specific national situations and social pressures all belongs to main elements of the third stream, i.e., the politics stream. At certain points, the streams come together and offer a window of opportunity for governments to decide how to address the issue at hand (3). Findings from each country were extracted and summarized using the comparative table. Then factors involved in the process of agenda setting were assessed using the content analysis method and the comparative table (Supplementary Tables 1-3).

Results

Problem stream

The findings of this study showed that international entities' advocacy drawing governments' attention to a specific issue has played an important role in highlighting the problem of maternal mortality in the process of agenda setting. In all selected countries, the problem has been highlighted since 1990. Several main factors led to reveal the problem; publishing the progress report of MDGs at country level highlighted the maternal mortality issue in these countries. A clear example can be observed in Bhutan (5), East Timor (6), Rwanda (7), Lao People's Democratic Republic (8), Maldives (9), Mongolia (10) and Cambodia (11). Also, conducting a national survey on maternal mortality and publishing the results in the Islamic Republic of Iran (12) and Cambodia (13) played an important role in highlighting the issue.

Political stream

The approach to shaping the political stream in the current study implied political stability, political will, key person's contribution and legislation. All the studied

countries, were in a state of political stability and peace, in the process of agenda setting (12,14-20) and enjoyed the commitment of statesmen in all of these countries (5,10,12-15,21-25).

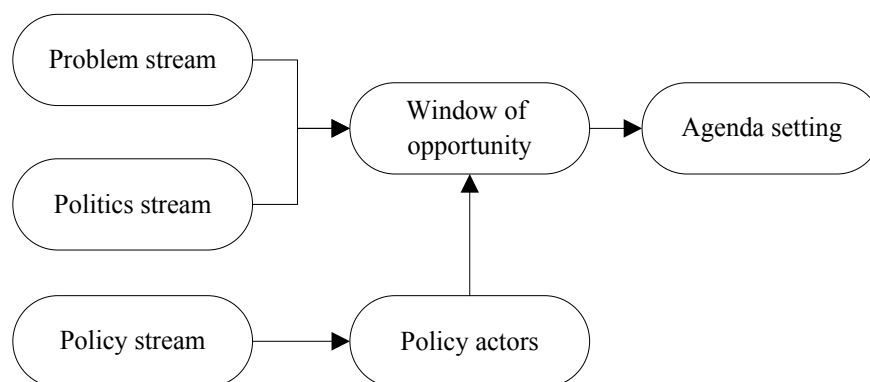
Key persons contributed in leading MDGs and in some cases specifically played a significant role in reducing maternal mortality, for example, the First Lady of Rwanda played a key role in leading policy-makers and planners to reduce maternal mortality through announcing the campaign of "Accelerating maternal mortality reduction" in 2009 and holding a meeting with high-level officials to this end (26). In addition, the Representative of the United Nations Population Fund in Bhutan played a special role in advocacy for reducing maternal mortality (14). Among the studied countries, two implemented interventions on legislation; in Mongolia the Public Health Policy was approved by its parliament in 2001 with the emphasis on access to reproductive health services for vulnerable groups and remote areas (27); and in Cambodia the Abortion Act was approved in its parliament in August 1997 (23).

Policy stream

The assessment of the policy stream in the agenda setting for maternal mortality reduction in this study included international technical or financial support, regional and international conferences, national plans and enabling factors which provide technical feasibility. All nine countries took advantage of technical or financial support from international organizations in the process of agenda setting (6,13,14,18,19,22,26,28). This study indicates that the concerns for maternal mortality were communicated to officials via international and regional conferences.

For example, officials from the Lao People's Democratic Republic participated at the International Conference on Population and Development in Cairo (19); officials from Cambodia participated at the Safe Motherhood Conference in Kenya (13); officials from Rwanda participated at the 4th Africa Ministerial Conference in Addis Ababa (26); the East Timorese independence leader, who later became the first president, participated at the General Assembly for Millennium Development Goals in September 2000; and officials

Figure 1 The Kingdon's multiple streams framework (3)



from East Timor participated in the Regional Conferences of the United Nations Development Fund on MDGs in Bangladesh in February 2003 (6). In addition, there was a well-defined plan in maternal mortality reduction in eight countries: Mongolia (22), Maldives (25), Lao People's Democratic Republic (19,24), Cambodia (13), Rwanda (26), Bhutan (5), Cab Verde (15), Islamic Republic of Iran (28).

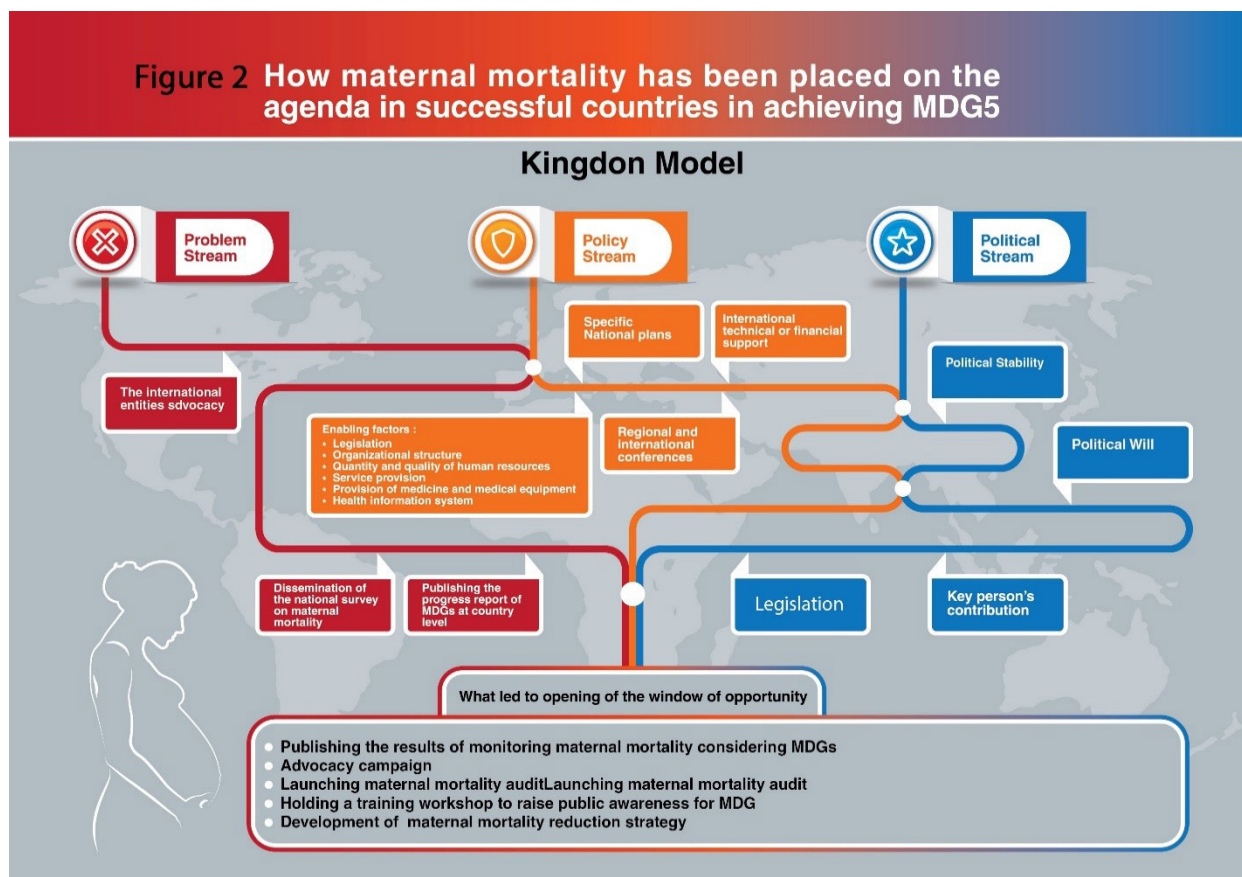
In the current study, enabling factors that make technical feasibility and shape policy stream included organizational structure, human resources, services, medicine and medical equipment provision, and health information system. Three of the studied countries implemented interventions on organizational structure. For example, the Mother and Child Health Office was established in the Ministry of Health in the Islamic Republic of Iran (12); the National Mother and Child Commission was established in the Lao People's Democratic Republic (54); and a Mother and Child Unit was established within the Ministry of Health structure in East Timor (6).

Interventions to increase the number of human resources in the domain of mother and child health were implemented in six of the studied countries including Maldives (16), Rwanda (26), Islamic Republic of Iran (28), East Timor (6), Cambodia (25) and Mongolia (18); and interventions in empowering human resources were conducted in four countries: East Timor (6), Maldives (16), Islamic Republic of Iran (28) and Mongolia (18).

In all the studied countries, interventions have been implemented to improve service provision in maternal health (5,6,8,15,16,18,22,23,28). Interventions have been also implemented to provide medicines and pharmaceutical products in Maldives (16), Lao People's Democratic Republic (19), Bhutan (5,29) and Mongolia (18); and interventions on health information systems implemented in Maldives (16) and Rwanda (26) by launching a maternal mortality audit system.

Opening a window of opportunity

Special events resulting in joining policy, politics and problem streams and opening a window of opportunity varied in the nine countries. In four countries, including Islamic republic of Iran (12), Bhutan (5), Cambodia (13) and Lao People's Democratic Republic (8), the window of opportunity opened after publishing the results of monitoring maternal mortality after considering MDGs. In two countries, Rwanda (22) and Cabo Verde (15), holding the advocacy campaign for maternal mortality reduction led to joining the three streams, and in Maldives (16) launching the maternal mortality audit was the joining point. In East Timor (20), holding a three-day training workshop aimed at raising public awareness for MDGs, situation analysis and assessment of relationship between goals of the national development plan with MDGs led to open the window of opportunity. In Mongolia, the development of maternal mortality reduction strategy was the opening of the window of opportunity (18) (Figure 2).



Discussion

Nine countries achieved the MDG 5 regarding maternal mortality reduction. Agenda setting of maternal mortality issue in these countries were analysed based on the three problem, policy and politics streams of Kingdon's model. Generation of evidence played a very important role in advocacy, planning and policy-making for maternal mortality reduction in low- and middle-income countries (30). This factor plays a significant role in highlighting the issue, convincing policy-makers and motivating elites (31).

Problem stream

In this study, using evidence to reveal the problem, convincing policy-makers and motivating elites have played a role in highlighting the problem. Thus, in six of the selected countries, the published progress report on the status of MDGs helped to shape the problem stream in the agenda setting process. In two countries, dissemination of the maternal mortality auditing report has also highlighted the problem. The assessment of the role of policy in achieving MDGs can be a guide to identify existing barriers and problems and facilitate the modification of current public policies to better achieve goals. The direct effects of the role of government in maternal and child mortality have been proved (32).

Political stream

In the current study, the approach to shaping the political stream implied political stability and political will to reduce maternal mortality in all nine countries. The political instability threatens maternal health by damaging health infrastructure and restricting transportation (33). In six of the studied countries, key persons contributed in leading MDGs, and in some cases specifically played a role in reducing maternal mortality. The support from country leaders and influential individuals, and its impact on agenda setting of issues related to maternal health, can be due to their influence (32). Policy-makers are more effective when they are led by leading people in the field of maternal mortality. Other countries' experience in this area confirmed this observation (2,31).

The assessment of those countries having an accelerated trend in maternal mortality reduction revealed the importance of rules and legislation in the domain of mother and child health (34). In this study, two countries approved legislation related to maternal health.

Policy stream

Some studies mentioned the positive role of international financial aid in countries with accelerated trend of mother and child mortality reduction (31). All the studied countries took advantage of technical or financial support from international organizations, which might have facilitated agenda setting. A set of international conferences by the United Nations since 1990 also indicated the reaffirmation of global commitment to reduce maternal mortality (31). International innovative plans also created concerns regarding maternal mortality issue among

many national health officials (35). In the current study, holding international and regional conferences in five countries and training workshops in two countries were among the influential factors.

It was noted that having a national plan specifying national priorities results in a targeted budget allocation, a shared common understanding of activities and a basis for accountability of community leaders and directors (36). Some of the successful countries included the achievement of the MDGs related to mother and child health in their priorities of national plans (30). This study finds that there was a well-defined plan in maternal mortality reduction in eight countries.

Although in some studies (30) having a specific structure within the governance domain was considered an effective success factor due to the creation of accountability, effectiveness and coordination, yet in the assessments no clear association was found between the existence of these structures and success in maternal mortality reduction. In two of the studied countries, an organizational structure responsible for addressing maternity health has been established.

Studies provide evidence of the direct and positive impact of the number of staff on health consequences (37). In many countries, mother and child mortality reduction resulted from the increase in key human resources' coverage in the domain of mother and child health (38). However, merely increasing the number of staff is not sufficient. Some studies indicated the importance of training, surveillance of staff and investment in improving the education system in the provision of midwifery emergency services (39). Interventions to increase the number of human resources were implemented in six of the studied countries and empowering human resources were conducted in four of these countries.

Strengthening the service delivery system to achieve MDGs is vital. These services include interventions that decrease mother and child mortality (30). In the current study, before opening the window of opportunity, all the countries implemented interventions in the domain of service delivery, primarily increasing access to and coverage of services and strengthening the technical feasibility of agenda setting.

A major part of mother and child mortality reduction was related to the improvement in access and receiving medicines and pharmaceutical products in the field of mother and child health and reproductive health. Four countries implemented interventions in providing medicines and pharmaceutical products. National efforts to reduce mother and child mortality depend on strengthening information systems and generating evidence for decision-making through assessment and evaluation mechanisms (30). A maternal mortality audit has been established in two of the countries.

Finally, it can be said that highlighting the issue (problem stream) had a significant impact on joining the three streams and opening the window of opportunity. The generation and use of evidence led to convincing

policy-makers, motivating elites and drawing people's attention. However, effects of other streams on opening the window of opportunity cannot be ignored. The assessment of policies that led to success and stakeholder analysis was not intended in this study. Conducting qualitative research in each of these countries can provide more details in this regard. Also, the mentioned actions in each of these countries, in terms of time, took place before opening the window of opportunity. Comparison of the agenda setting process between the countries that achieved MDG 5 and the other countries would provide more evidence, but was not the focus of this study and could be addressed in future research.

Conclusion

The maternal mortality problem was placed on the agenda of policy-makers in the studied countries after international entities began agenda setting at the international level. This resulted in sensitization of officials and their commitment to reduce maternal mortality. Political stability and commitment, having a national plan, and benefiting from technical or financial support of international entities were common features among almost all the studied countries. Measures that strengthened health systems by providing health infrastructure, trained staff,

information systems etc. create an enabling environment to address a problem and facilitate agenda setting.

An important reason for placing the issue of maternal health on the agenda of policy-makers is to highlight the issue by one of the three streams; strengthening one stream can strengthen others and all three should be strengthened together. The key actions leading to the open window of opportunity for maternal mortality reduction were those that led to highlighting the problem, generating evidence and its publication, and drawing the attention of policy-makers and planners. However, the impact of other streams cannot be ignored.

The model-based approach through the application of the Kingdon's model has been useful for the scrutiny of influential factors on agenda setting and this experience can be applied to the analysis of other policies. Analysing the experiences of the selected countries offers guidance on how political priorities can be generated for maternal mortality and other health problems.

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Competing interests: None declared.

Supplementary Table 1 Trends in estimates of maternal mortality, 1990–2015

Country	MMR*						% change in MMR between 1990 and 2015	Average annual % change in MMR between 1990 and 2015
	1990	1995	2000	2005	2010	2015		
Iran (Islamic Republic of)(4)	123	80	51	34	27	25	79.7	6.4
Bhutan(4)	945	636	423	308	204	148	84.3	7.4
Cambodia(4)	1020	730	484	315	202	161	84.2	7.4
Cabo Verde(4)	256	150	83	54	51	42	83.6	7.2
Lao People's Democratic Republic(4)	905	695	546	418	294	197	78.2	6.1
Maldives(4)	677	340	163	101	87	68	90.0	9.2
Mongolia(4)	186	205	161	95	63	44	76.3	5.8
Rwanda(4)	1300	1260	1020	567	381	290	77.7	6.0
Timor-Leste(4)	1080	897	694	506	317	215	80.1	6.5

*Maternal deaths per 100 000 live births (4)

Supplementary Table 2 The multiple streams of Kingdon's theory in terms of MDG 5 reduction in the nine studied countries

Country	Problem Stream	Policy Stream	Political Stream
Islamic Republic of Iran	At the same time as the establishment of the country health care network in 1985, maternal and child health was set as one of the important components of the health service delivery system (12).	<ul style="list-style-type: none"> • Emphasis on the reduction of maternal mortality in the third to fifth country development plans • Launch of the higher school of midwifery in 1939 • Establishment of the mother and child health office affiliated to the general office of family health at the ministry of health in 1976 • Launch of the healthcare network system in 1985 • Training family health technician in 1983 to provide integrated services • Training local midwives in 1983 • Training village midwife in 1990 • Establishment of maternity facilities in villages along with rural health centers to increase access (28). 	<ul style="list-style-type: none"> • Government commitment to promoting maternal health • Government commitment to the Millennium Development Goals • Publishing results of the RAMOS study in 2008 (12).
Bhutan	Since 1990, maternal mortality has been recognized as a problem (560 per 100,000 in 1990). In 2002, the trend assessment of the achievement of the MDGs was conducted and its results were published in which challenges ahead to reduce maternal mortality and the necessity of strengthening infrastructures were emphasized (5,29)	<ul style="list-style-type: none"> • The role of the representative of the United Nations Population Fund, who has played a special role in advocacy • Technical support of WHO for developing national plans • Development of a maternal and child health programme within the National Action Plan 1997 <p>The following actions were taken to achieve the goal of this Action Plan :</p> <ul style="list-style-type: none"> • Tetanus oxidation • Distribution of folic acid and iron to reduce anaemia in pregnant women • Implementation of the Safe Motherhood and Maternal health programme, focusing on the provision of “Women-Friendly Services” in 1997 with the following objectives: <ul style="list-style-type: none"> • Enhancement of pre and postnatal care • Increase the skilled birth attendance percentage • Distribution of safe delivery kits at home since 1998 • Establishment of midwifery care centers for maternal emergencies (Emoc) since 2000 (14,29) • Development of a partnership document with WHO in early 2000 • Development of a strategy for cooperation with WHO (2001-2002) • Publishing the first official report on the progress of the MDGs in Bhutan in 2002 • The ninth country five-year Plan (2002-2007) has focused on maternal health, in particular reducing maternal mortality, increasing the percentage of skilled birth attendance and reducing anaemia as a facilitator of maternal mortality reduction (29). 	<ul style="list-style-type: none"> • The king's commitment to maternal health • The queen's commitment to maternal health • The government's commitment to achieve the MDGs (5)
East Timor	Since 2001, with publication of the first progress report on MDGs, maternal mortality has been considered a problem. In the first national development plan 2002, which was developed in compliance with MDGs, maternal mortality was mentioned as one of the major problems of the country (20,21).	<p>From September 1999 to January 2000, WHO, together with UNICEF, acted as a “Temporary Ministry of Health”. An Interim Health Authority was formed in February 2000, followed by the creation of the Division of Health Services in July 2000. The Ministry of Health came into being in September 2001. (the reduction of maternal and infant mortality was one of the mentioned goals) (20), and conducted the following:</p> <ul style="list-style-type: none"> • Establishment of the maternal and neonatal health unit in the structure of the ministry of health as a subset of the healthcare services delivery sector • Training midwives on safe motherhood, safe childbirth, and management of sexually transmitted infections (STIs) in 2000 by three international agencies including UNFPA, WHO, UNICEF • Employment of gynecologists and obstetricians by the United Nations Population Fund for the access to services in gynecological and obstetric emergencies • Publishing the first official progress report on MDGs in 2001 (6) • situation analysis report of the country, titled country general assessment with the participation of the International Agency in 2001 • Participation of the country's delegate in regional conferences on MDGs – United Nations Development Fund Conference in Bangladesh in February 2003 • A joint training workshop by the United Nations Development Fund and the World Bank in Fiji in March 2003 	<ul style="list-style-type: none"> • Change in the type of governance and political stability • The country, after centuries of being a colony, in 2002 gained independence and left behind the internal conflicts and political instability. <p>Statesmen's commitment to achieve the MDGs:</p> <ul style="list-style-type: none"> • Participation of the East Timorese independence leader, who later became the first president, at the General Assembly for the development of MDGs in September 2000 • Participation of the prime minister, key ministers and representatives of the private sector in the committee on the management of MDGs (6)

Supplementary Table 2 The multiple streams of Kingdon's theory in terms of MDG 5 reduction in the nine studied countries

Country	Problem Stream	Policy Stream	Political Stream
Rwanda	After decades of tension and genocide, Rwanda faced many health problems. Severe labour shortage, constraints on health infrastructure, and high rates of maternal and infant mortality (26).	<ul style="list-style-type: none"> • Community-based measures to reduce maternal mortality in 1995; launch and employment of community health workers • Publishing the national report on the progress of the MDGs in Rwanda by the government with the participation of UNDP (2003, 2007) • Modification of the system of apprenticeship of the community health workers; for each village, three persons one man and one woman for health care and one woman particularly for maternity care during pregnancy and pre, post-natal and neonatal care (2007) • Launch of maternal mortality audit in 2008 • Development of a roadmap to accelerate the reduction of maternal mortality with the participation of the United Nations Population Fund in 2008 • Changing the procedure of childbirth at home to childbirth at maternity centres • Decentralization of health services • Use of community participation (22,26) 	<p>After decades of tension and genocide in 1994, which resulted in more than two million homeless people, Rwanda has been politically stable for almost two decades.</p> <ul style="list-style-type: none"> • The commitment of the president and the first lady to maternal health • The commitment of government to achieve the MDGs • Participation of the health minister in the 4th Africa Ministerial Conference, held in May 2009, Addis Ababa • Launching a campaign to reduce maternal mortality in Africa with the motto "Women should not lose their lives when they save lives" • Announcement of this campaign in Rwanda on 7 October, 2009 by the first lady of the country (22,26)
Cabo Verde	Maternal mortality was recognized as an issue in the 1990s and was put in the 2001-2005 programme as a priority. Maternal mortality reduction was targeted in the national plan 2000 (15)	<ul style="list-style-type: none"> • Support of the UN representative in the country • Developing the national strategy 2002-2005 for achieving the MDGs • Support of international organizations • Organizing the NGOs as part of the health system to offer clinical and counseling services for pregnancy and birth • Developing a national plan to integrate reproductive health and maternal mortality in the health system 2001. • A reproduction health programme has been designed as well as standards and procedures of services (15). 	<ul style="list-style-type: none"> • After independence from Portugal in 1975, the political situation became meaningful and the power between various political groups was rotated and stabilized. • The prime minister's commitment to maternal health • Commitment of the minister of economy to achieve the MDGs • Commitment of the government of Cabo Verde to include Maternal health in the health system (15)

Supplementary Table 2 Multiple streams of Kingdon's theory for MDG 5 reduction in the nine studied countries (continued)

Country	Problem Stream	Policy Stream	Political Stream
Cambodia	Maternal mortality has been mentioned as a major issue in the health system in the safe motherhood plan in 1997 (11,13)	<ul style="list-style-type: none"> • Agreement on the policy of birth interval and the implementation of several pilot projects in this area (1991) • Agreement with permanent contraception • Implementation of birth spacing program with the assistance of the United Nations Population Fund (1994) • National policy and strategy 1994-1996 • Health system development plan 1994-1996 • Development of the policy of birth spacing by the Ministry of Health in January 1995 as a solution for women's health and influential on the health and nutrition (17) • Publishing the research results regarding the family planning demand on permanent methods (23) • Implementation of the maternal and child health program, JICA by the Government of Japan (1995) • Health coverage program 1996 • Guideline for the launch of a health centers in regions in Cambodia 1996 • Implementation of programs related to maternal and neonatal health by the ministry of health in collaboration with the National Center for Maternal and Neonatal Health (1996-2000) (17) • Health human resources development plan 1996-2005 • Publishing the results of the analysis of maternal health status in 1997 • Holding a workshop based on the results of the maternal health status analysis, 23-27 June 1997, with 120 participants from national and international entities • Development of policy, strategy and action plan for safe motherhood 1997 • Initiation of the reproductive health program with the assistance of the WHO including safe maternity, prevention of unsafe abortion, prevention and management of STDs in 1997, and generalization to the whole country until 2000 • UNFPA assistance to the women's health sector, the ministry of women's affairs for capacity building and the ministry of health in planning and launching of sustainable programs on reproductive health • Implementation of the Youth Reproductive Health Program in mid-1997 by the United Nations Population Fund and the European Union • Implementation of the empowerment projects (TOT) for medical staff including doctors and midwives by the government of Japan 1997 • Actions aimed at improving services during pregnancy, nutrition and post-natal care by the government of Japan 1995 (17,23) • Publishing the first report on progress in MDGs 2003 	<ul style="list-style-type: none"> • After two decades of war and political instability, since the 1998 election a kind of political stability was gained that allows the continuity of policy making and planning. Political stability (23) • The prime minister's commitment to maternal health • The commitment of the government and the minister of health to achieve the MDGs • Endorsement of the recommendations of the Safe Motherhood Conference, Nairobi, Kenya, 1987 and the Action Plan of the International Conference on Population and Development, Cairo, Egypt, 1994 by the delegation of the Royal Government of Cambodia. • Approval of the Abortion Act in parliament in August 1997 (13,17)
Lao People's Democratic Republic	In 1995, the high maternal mortality rate was highlighted in the national birth spacing policy and with understanding the importance of the issue, this policy was developed in order to reduce maternal mortality and morbidity (8,19).	<p>Participation of the delegation of the country in the Cairo International Conference on Population and Development</p> <ul style="list-style-type: none"> • Development of national birth spacing policy in 1995 • Development of the safe motherhood and safe childbirth program in 1997 • Development of national population and development policy in 1999 (19) • Tetanus vaccination • Prescribing folic acid and iron to prevent anemia during pregnancy • National report on the progress status of MDGs by the government with the participation of UNDP in 2004 (8) 	<ul style="list-style-type: none"> • The commitment of the ministry of health to the national maternal, infant and child health programs • government commitment to achieve the MDGs (19) • the role of the deputy of the prime minister, who also was the minister of foreign affairs, as the head of the national committee for monitoring the achievement to MDGs • Establishment of the national commission of mother and child (1999) (8)

Supplementary Table 2 The multiple streams of Kingdon's theory in terms of MDG 5 reduction in the nine studied countries (concluded)

Country	Problem Stream	Policy Stream	Political Stream
Maldives	With the introduction of a maternal death audit in 1997, more reliable data on MMR was available. In 1990 the maternal mortality rate stood at around 500 per 100,000 live births and was addressed as a health problem (16).	Development of the first three-year health programme focusing on primary healthcare services 1980 (following the declaration of Alma-Ata in 1997) <ul style="list-style-type: none"> • Maternal mortality assessment system since 1990 • Increase the number of human resources in health system to 56% (1994-1999) (16) • Development of the first long-term health plan (1996-2005) in 1995 • Development of the second long-term health plan (2006-2015) • Detection of high-risk pregnancies • Improving the quality of services in distant areas • Focusing on reduction of anaemia in pregnant women (distribution of supplements) • Development of hospitals • Employment of doctors in health centres • Education for health system human resources • Strengthening the provision of midwifery emergency services on remote islands • Change the service centres on remote islands to hospitals (9) • Publishing the progress report on MDGS by the Ministry of Health and Ministry of Planning 2005, 2007 	<ul style="list-style-type: none"> • Government commitment to fulfill international goals (25)
Mongolia	The country entered into a democratic phase in 1990 after the Soviet Union's collapse. The years immediately following the political transition witnessed a deterioration of the healthcare system and a resultant rise in maternal mortality. The high rate of maternal mortality has been recognized since 1990 (18)	<ul style="list-style-type: none"> • Collaborative strategic approach for reducing maternal mortality • Maternal mortality reduction strategy 2001-2004 • National strategic plan for reproductive health • Support from national and international partners (10) • Training of staff about reproductive and sexual health (including gynecologists) with the assistance of the United Nations Population Fund and UNICEF • Providing required medicines in midwifery emergencies • United Nations Population Fund support for contraceptive distribution • Conducting training and campaigns for family planning training that had impact on the acceptance and demand for reproductive health services. • Reestablishment of maternal waiting homes near the hospital in 1993 (as an important part of the referral system) • Focusing on intrapartum care • Opening of local diagnostic and therapeutic centres in three regions of the country • Logistic services of the United Nations Population Fund for reproductive health programmes (27) 	<ul style="list-style-type: none"> • Government commitment to fulfill international obligations • Legal abortion act 1989 • The adoption of the public health policy in 2001 by the parliament with the emphasis on the improved access to reproductive health services for vulnerable groups and remote areas (18)

Supplementary Table 3 Opening of window of opportunity

Country	Window of opportunity
Islamic Republic of Iran	Although the maternal mortality issue has been considered since 1985, after publishing the results of RAMOS study in 1997, the maternal mortality issue was put at the centre of attention (12).
Bhutan	The maternal mortality issue has been considered as a problem since 1990; however, the issue attracted attention through developing the mother and child health improvement programme and the safe motherhood and reproductive health programme in 1997, and after publishing the first progress report on MDGs in 2002 it was put at the centre of attention (14).
East Timor	Maternal mortality reduction was considered an issue since 2001 along with publishing the first progress report on MDGs. However, after holding a two-day training workshop in March 2003, it was put at the centre of attention. This workshop was held aiming at raising public awareness about MDGs, the current situation analysis and the assessment of relationship between goals of the national development plan with MDGs and challenges ahead to achieve the MDGs (6).
Rwanda	Although the agenda setting process had been started in 2000, the issue was put at the centre of attention through announcing the campaign of “accelerating maternal mortality reduction in Africa” in Rwanda on 7 October 2009 by the first lady of the country and holding a meeting with high levels officials (26).
Cabo Verde	Although the agenda setting process had been started in 2000, the issue of maternal mortality was put at the centre of attention through launching the national campaign to achieve MDGs in 2003 (15).
Cambodia	The agenda setting process had been started in 1990 and the issue was put at the centre of attention after publishing results of the analysis of maternal health status in 1997 (13).
Lao People's Democratic Republic	While the problem stream had been considered since 1995 and various programmes were developed to reduce maternal mortality from 1995 to 2004, it seems that the window of opportunity for maternal mortality reduction opened after the development of the comprehensive reproductive health plan in 2004 and publishing the national progress report on MDGs (19).
Maldives	The agenda setting process started in 1990. In 1997, the window of opportunity for maternal mortality reduction was opened along with launching maternal mortality audit and consequently several actions were taken to reduce maternal mortality. Again, in 2009, when maternal mortality rate increased, a new window of opportunity was opened that led to revising the maternal mortality assessment system and establishing a special committee to assess mortality and morbidity. Special attention was paid to the issue of maternal mortality and a series of new actions were shaped (9).
Mongolia	It seems that the agenda setting process started in 1990 and through developing the maternal mortality reduction strategy (2001-2004), the maternal mortality issue was put at the centre of attention (27).

Analyse de la définition des enjeux prioritaires pour la réduction de la mortalité maternelle : exploration des facteurs influents à l'aide du modèle des flux de Kingdon

Résumé

Contexte : La mortalité maternelle est considérée comme inacceptable.

Objectifs : La présente étude visait à analyser le processus de définition des enjeux prioritaires dans les politiques de réduction de la mortalité maternelle dans neuf pays qui ont réussi à réaliser le cinquième objectif du Millénaire pour le développement (OMD 5) en utilisant la théorie des flux multiples de Kingdon.

Méthodes : Cette étude comparative a analysé le processus de définition des enjeux prioritaires dans neuf pays qui ont réussi à réaliser l'OMD 5. Ce processus a permis d'analyser l'utilisation du modèle à flux multiples de Kingdon. Afin d'extraire les similitudes et les différences dans la définition des enjeux prioritaires, la méthode d'analyse du contenu, les documents et les rapports disponibles, ainsi qu'un tableau comparatif ont été utilisés.

Résultats : L'attention initiale accordée au problème du taux élevé de mortalité maternelle était différente dans les pays étudiés, mais les OMD et les rapports officiels des pays en étaient le principal moteur. La stabilité et la volonté politique, la contribution des personnes clés et la législation ont été considérées comme des facteurs influents qui renforcent le courant politique. L'appui technique ou financier international, les conférences régionales et internationales, les plans nationaux et les facteurs favorables, qui assurent la faisabilité technique, étaient les facteurs les plus importants qui influencent le courant politique. Les facteurs habilitants comprenaient l'approbation des règlements et des lois, l'augmentation de la quantité et de la qualité des ressources humaines, la structure organisationnelle, l'amélioration de la prestation des services, le développement des infrastructures, la fourniture de médicaments et de matériel et le renforcement du système d'information sanitaire.

Conclusions : Les trois flux du modèle – problème, stratégie et politique – ne sont pas séparés les uns des autres. La stabilité et l'engagement politiques, le fait d'avoir un plan national et de bénéficier de l'appui technique ou financier d'entités internationales sont des caractéristiques communes à presque tous les pays étudiés. Les mesures clés qui ont conduit à l'ouverture de la fenêtre d'opportunité sont celles qui ont permis de mettre le problème en évidence.

تحليل إنشاء برنامج لتخفيض وفيات الأمهات: بحث العوامل المؤثرة باستخدام نموذج اتجاهات كينجدون

فرح باباي، بوران رئيسي، حميد رواقي

الخلاصة

الخلفية: تُعدّ وفيات الأمهات وفاة غير مقبولة.

الأهداف: هدفت هذه الدراسة إلى تحليل عملية إنشاء برنامج لسياسات تخفيض وفيات الأمهات في تسعة بلدان نجحت في تحقيق الهدف الخامس من الأهداف الإنمائية للألفية باستخدام نظرية كينجدون للاتجاهات المتعددة.

طرق البحث: حللت هذه الدراسة المقارنة عملية إنشاء برنامج في تسعة بلدان نجحت في تحقيق الهدف الخامس من الأهداف الإنمائية للألفية. وحللت إنشاء البرنامج استخدام نموذج كينجدون للاتجاهات المتعددة. ولاستخراج المشابهات والاختلافات في عملية وضع برنامج، استخدم أسلوب تحليل المحتوى، والمستندات والتقارير المتاحة، والجدول المقارن.

النتائج: كان الاهتمام الأولي لمشكلة ارتفاع معدل وفيات الأمهات مختلفاً في البلدان محل الدراسة، ولكن الأهداف الإنمائية للألفية والتقارير الرسمية للبلدان كانت الدافع الرئيسي. ويُعدّ الاستقرار السياسي، والإرادة السياسية، وإسهامات الشخصيات البارزة والتشريعات من العوامل المؤثرة التي تعزز المسار السياسي. وكان الدعم التقني أو المالي الدولي، والمؤتمرات الإقليمية والدولية، والخطط المحلية وعوامل التمكين، التي توفر الجدوى التقنية، من أهم العوامل المؤثرة في المسار السياسي. وتشمل عوامل التمكين اعتماد القوانين والتشريعات، وزيادة حجم ونوعية الموارد البشرية، والهيكلة التنظيمي، وتحسين تقديم الخدمات، وتطوير البنية التحتية، وتوفير الأدوية والمعدات، وتعزيز نظام المعلومات الصحية.

الاستنتاجات: الاتجاهات الثلاثة: المشكلة والسياسات والسياسة ليست منفصلة عن بعضها البعض. ويُعدّ الاستقرار والالتزام السياسي، وتوافر خطة وطنية والاستفادة من الدعم التقني أو المالي المقدم من الجهات الدولية سمة مشتركة بين جميع البلدان محل الدراسة تقريباً. وكانت الإجراءات الرئيسية التي تؤدي إلى إتاحة الفرصة هي الإجراءات التي أدت إلى إلقاء الضوء على المشكلة.

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Practice implications of an antimicrobial stewardship intervention in a tertiary care teaching hospital, Qatar

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Abstract

Background: Antibiotic misuse is a worldwide public health problem and has been associated with increased morbidity, length of hospital stay, mortality, healthcare costs, and most importantly antibiotic resistance.

Aims: We aimed to evaluate the compliance of antibiotic prescribing with national guidelines, assess how educational interventions can best be utilized to make impact and fill gaps for optimal antibiotic utilization, and to identify facilitators and barriers to implementing ASPs in Qatar.

Methods: Six cross-sectional baseline audits of antibiotic prescribing were conducted over a two-week period at a tertiary care teaching hospital. A sub-analysis of prescriptions with follow up has followed. An educational intervention utilizing the PDSA (Plan-Do-Study-Act) tool was implemented to address gaps identified. A repeated audit was done to assess the impact of change. Lastly, interviews were conducted to recognize perceived facilitators and barriers for ASP implementation, identify strategies to overcome barriers, and evaluate the effectiveness of educational interventions.

Results: The most common indication for antibiotic prescribing was febrile neutropenia (20.7%). The most frequently used class of antibiotics was carbapenems (21.4%). Sixty percent of prescriptions complied with guidelines. The rationale behind choosing not to adhere to guidelines was not documented in 37.2% of cases. Suboptimal documentation in records was targeted through our intervention. The audit post intervention showed slight improvement in documentation. Facilitators and barriers included: collaboration and communication among teams, compliance with guidelines, interventions documented by clinical pharmacists, and electronic system errors.

Conclusions: Effective communication, continuous documentation in records, and repetitive education promote rational antibiotic prescribing and enhance ASPs.

Keywords: antibiotics, antimicrobial stewardship, educational intervention, clinical practice, Qatar

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Introduction

Antibiotics are among the most commonly prescribed medications in hospital settings yet inappropriate utilization frequently occurs (1). Antibiotic misuse is associated with increased mortality, morbidity, length of hospital stay, cost of healthcare, and most importantly antibiotic resistance (1). Antimicrobial Stewardship refers to a set of coordinated interventions intended to optimize the use of antimicrobials in various settings including outpatient clinics and inpatient healthcare settings (2,3). In fact, the proper use of antibiotics leads to enhancing drug and patient safety, reducing drug consumption and cost containment, limiting the emergence of resistant organisms, with an end goal of improving patient outcomes (4). Antimicrobial stewardship programmes (ASPs) are designed to ensure appropriate selection of an effective antimicrobial drug regimen, dose, time, duration of therapy, and route of administration (5). An effective programme is one that is led by a coalition of physicians, clinical pharmacists and other healthcare members, and is committed to leadership where necessary humanistic, financial, information technology, and time resources are

implemented (6–9).

Several antimicrobial stewardship strategies have been previously evaluated in hospital settings such as streamlining, prospective audit with feedback, formulary restriction and preauthorization, amongst others (4,5). Such interventions can be only successful if they meet the specific needs of the healthcare institution with dedicated work between healthcare professionals, administrators, information technology personnel, and policy-makers (2,10). Point prevalence studies (PPSs) serve as audit markers and practical surveillance tools to monitor antibiotic prescribing patterns over time (11). They tend to assess antibiotic use across and within healthcare settings, identify targets for quality enhancement, and track differences in practices between institutions (12). Moreover, monitoring antibiotic use and prescribing and identifying resistance patterns is crucial in identifying opportunities for improvement, and strategies to overcome barriers associated with antibiotic misuse (13). In addition, regular reporting of information on antibiotic use and outcome results to multidisciplinary teams serves as a key element of successful ASPs (13). In fact,

education and ongoing training opportunities should be readily available for healthcare professionals with an aim to promote effective antibiotic prescribing (14).

Patients diagnosed with cancer, in particular with hematologic malignancies and neutropenia, tend to be more vulnerable to acquiring infections such as *Clostridium difficile* infection (CDI), bloodstream and other organ infections caused by multi-drug resistant organisms (MDROs) (15,16). Thus, antibiotics are often prescribed for both treatment and prophylaxis. In fact, appropriate antibiotic selection, rationale behind the use of antibiotics, and proper adherence to a successful ASP in such population was associated with lower mortality rates (17). A previous PPS conducted by Hammuda et al. in Qatar at the National Center for Cancer Care and Research (NCCCR) showed that only 57.6% of antibiotic prescriptions met national treatment guidelines or followed local antibiotic prescribing policies (18). Since the time of that study conduction, local guidelines have been updated and the institution has introduced an ASP led by a physician and a dedicated clinical pharmacist. However, no systematic evaluation of this service has occurred to date as well as any impact of educational interventions on clinical practice.

This study targets four objectives; primarily, we aimed to evaluate antibiotic prescribing in cancer patients by assessing compliance with local prescribing guidelines over multiple time points by performing baseline PPSs. This was followed by a prospective audit to characterize and assess antibiotic interventions during the patient's follow-up period by tracking the prescribing and resistance patterns based on culture results. Secondly, we aimed to educate the multidisciplinary team of our findings and provide feedback using the "Plan, Do, Study, Act" (PDSA) quality improvement tool adopted from the Institute of Healthcare Improvement. Thirdly, we intended to evaluate the impact of the educational intervention on AMS by repeating a second antibiotic audit. Lastly, we aimed to identify facilitators and barriers to ASP implementation in Qatar through interviews with pharmacists who witnessed the educational intervention.

Data sources and methods

Phase 1: Baseline PPSs with prospective follow up on antibiotic therapy

Six cross-sectional audits of antibiotic prescribing were conducted at NCCCR in Qatar. NCCCR is a 65-bed tertiary care teaching hospital that admits oncology/haematology, palliative care, and bone marrow transplant patients. The PPSs were performed on six separate days over an 11-day period between February 14 and February 24, 2016. Six PPSs were conducted to account for variations in weekly prescribing, as well as prescriber dependent prescribing; as consulting physicians typically rotate on a weekly basis. The audits were conducted on a Sunday, Monday, and Wednesday of each of the two weeks. All data was collected from electronic healthcare records at NCCCR. This hospital documents all patient information

using CERNER® (Missouri MO, United States of America). Ethical approval was obtained from the Qatar University Institutional Review Board (QU-IRB 521-E/15), and Hamad Medical Corporation, Medical Research Center (15415/15).

All patients admitted on each study day were assessed for inclusion. Patients were included if they received at least one systemic antibacterial agent on the study day. Patients receiving antibiotics through outpatient intravenous programs were excluded. Patient receiving anti-tuberculosis, anti-fungal or anti-viral prescriptions were also excluded. On each day, all medical wards were audited using an adapted modified audit tool: 2006 European Surveillance of Antibiotic Consumption Point Prevalence Survey (ESAC PPS) Audit Tool (19). Data was collected by three pharmacy students, a research collaborator, and the primary research investigator. A senior investigator verified all data. Data collected included: age, gender, antimicrobial agent (dose, route, frequency and duration); classified according to the World Health Organization's anatomical therapeutic chemical (ATC) classification system (20), treatment indication, guideline compliance, and documentation of rationale if guidelines were not adhered to. Guideline compliance was determined using institutional antibiotic prescribing policies, which refer to preauthorized antibiotics policies, and are based on local antibiogram data; however, they are primarily in line with guidelines from the Infectious Diseases Society of America (IDSA) or other tertiary references (21,22).

The second part of phase 1 included a prospective observation and assessment of physicians' prescribing behaviour during patient follow-up period, that applies to patients with length of hospital stay of at least 48 hours and have received two doses or more of an antibiotic on those days. Culture and sensitivity results were taken into account for these patients (bug/drug mismatch, escalation or streamlining of therapy). This was performed over 14 days as per our study protocol. Data was entered into the IBM® SPSS® Statistics V23.0 (New York NY, United States of America) software for analysis. Data was analyzed descriptively.

Phase 2: Feedback using an educational intervention

An educational intervention was performed to evaluate the results obtained from the first phase of our study; specifically, to address the gaps and areas for improvement that were identified. The "Plan-Do-Study-Act" (PDSA) model was utilized which is a quality improvement tool implemented by the Institution for Health Improvement with the goal of establishing a functional association between process changes in healthcare systems and variations in outcomes (23,24). We performed an on-spot bed-side educational intervention during multidisciplinary rounds on the wards targeting all stakeholders (each team consisted of a consultant, medical fellow, medical resident, clinical pharmacist and a nurse) within four medical teams (infectious diseases, oncology, he-

matology/bone marrow transplantation, and palliative care) to inform them about the goal of the intervention and to gather feedback for future improvement. After implementation, the intervention was studied in terms of impact on practice. This methodology is adapted from a well-established PDSA model used for interventional techniques aiming to promote changing behaviors (23).

Phase 3: Impact of change

After the interventional period was complete, an audit of prescribing behaviours was repeated to assess the impact of change. The medical records were reviewed post the intervention on the same day of the intervention. The main outcome measure we looked at was to address the improvement of documentation in patients' electronic healthcare records and to determine whether the intervention did address the gaps identified on the same day of the educational intervention after the multidisciplinary rounds were over. The same statistical analysis approach in phase 1 of the study was used to interpret the results obtained. A PDSA worksheet adapted from the Institute for Healthcare Improvement was used to document a test of change (23).

Phase 4: Qualitative thematic analysis

In order to identify facilitators and barriers to effective implementation of ASPs within Qatar, a qualitative research study was conducted that aimed to identify perceptions

of pharmacists regarding stewardship principles, procedures, and sustainability, in addition to evaluate the effectiveness of educational interventions on the enhancement of AMS in the future. A pre-defined topic guide for the semi-structured interviews was developed. The guide included 10 open-ended questions. The interviewing process took place at NCCCR. Every interview began with an engagement question followed by a series of exploratory questions and ended with an exit question. All interviews were recorded using a recording device and an informed consent was obtained prior to initiating the process. Each interview lasted between 20 and 30 minutes. Each interview was transcribed verbatim which was reviewed by the primary research investigator for accuracy and completeness. Transcripts then underwent a content analysis using an inductive, open-coding approach (25).

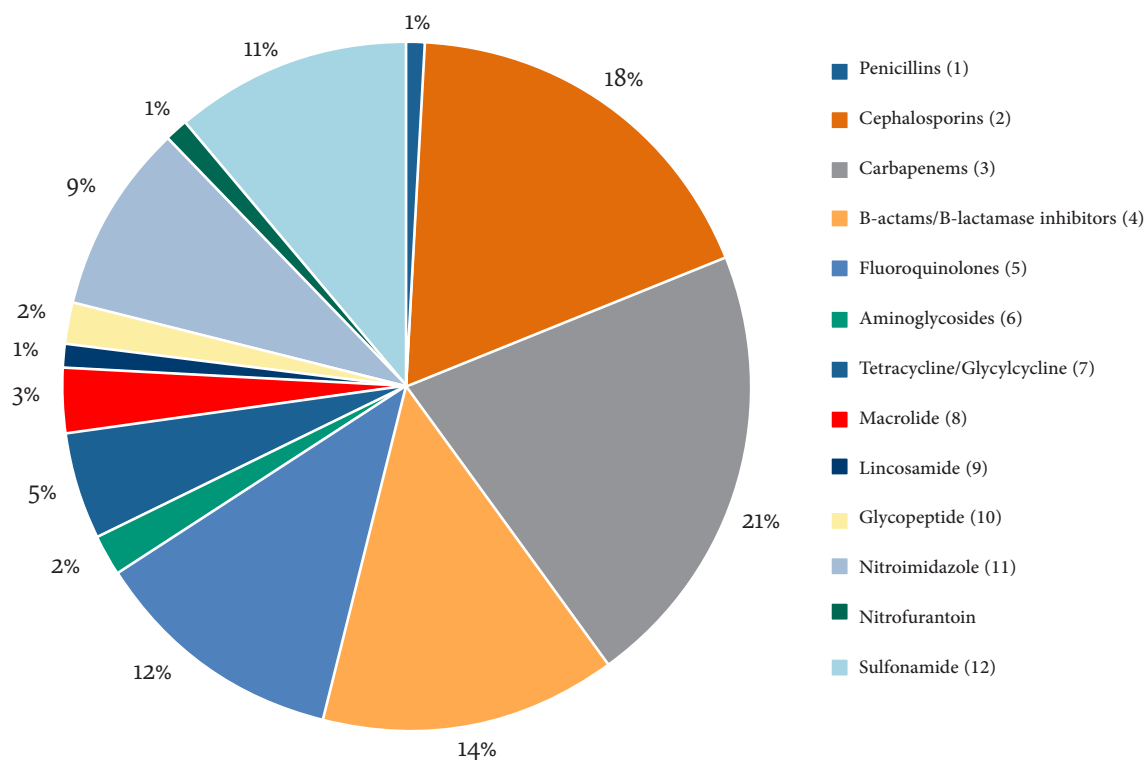
Results

Phase 1: Prospective audit

Six-point prevalence studies

The mean age of patients whose medical records were audited was 47.2 years with a predominance of the male gender (70.5%). Table 1 shows the different types of infections for which an antibiotic was prescribed. The most common documented reason for prescribing antibiotics was febrile neutropenia (20.7%) followed by bacteremia (14.7%). However, rationale for antibiotic use was

Figure 1 Usage of antibiotics by classes



1: amoxicillin, ampicillin, penicillin; 2: cefazolin, cefuroxime, ceftriaxone, cefepime; 3: ertapenem, meropenem; 4: amoxicillin/clavulanic acid, piperacillin/tazobactam; 5: ciprofloxacin, levofloxacin, lomefloxacin, moxifloxacin; 6: amikacin, gentamicin; 7: doxycycline/tigecycline; 8: azithromycin; 9: clindamycin; 10: vancomycin; 11: metronidazole; 12: trimethoprim/sulfamethoxazole

Table 1 Usage of antibiotics by indication

Indication* N (%)	PPS1	PPS2	PPS3	PPS4	PPS5	PPS6
HEENT infection	2 (5.1%)	2 (5.4%)	2 (5.9%)	2 (5.3%)	2 (5.3%)	0 (0.0%)
SSS infection	1 (2.6%)	2 (5.4%)	4 (12.0%)	6 (16.0%)	6 (16.0%)	5 (15.0%)
CAP	1 (2.6%)	3 (8.1%)	1 (2.9%)	2 (5.3%)	2 (5.3%)	0 (0.0%)
HAP	2 (5.1%)	2 (5.4%)	1 (2.9%)	1 (2.6%)	1 (2.6%)	2 (6.1%)
PJP prophylaxis	3 (7.7%)	3 (8.1%)	4 (12.0%)	3 (7.9%)	3 (7.9%)	3 (9.1%)
GI infection	6 (15.0%)	5 (14.0%)	6 (18.0%)	6 (16.0%)	3 (7.9%)	3 (9.1%)
UT infection (complicated/uncomplicated cystitis/ catheter-acquired)	2 (5.1%)	2 (5.4%)	1 (2.9%)	1 (2.6%)	1 (2.6%)	2 (6.1%)
Blood infection (bacteremia)	8 (21.0%)	6 (16.0%)	5 (15.0%)	5 (13.0%)	4 (11.0%)	4 (12.0%)
Febrile neutropenia	8 (21.0%)	7 (19.0%)	8 (24.0%)	8 (21.0%)	7 (18.0%)	7 (21.0%)
Undefined/unknown	6 (15.0%)	5 (14.0%)	2 (5.9%)	4 (11.0%)	9 (24.0%)	7 (21.0%)
Total	39	37	34	38	38	33

*HEENT: head-eye-ear-nose-throat; SSS: skin and skin structure; CAP: community-acquired pneumonia; HAP: hospital-acquired pneumonia; PJP: *Pneumocystis jirovecii* Pneumonia; GI: gastrointestinal; UT: urinary tract

not present in 15.2% of cases. The most frequently used class of antibacterial agents was carbapenems (21.4%), then cephalosporins (18.2%), followed by beta-lactam/beta-lactamase inhibitor combinations (14.1%). Frequencies of prescribed antibacterial agents per day throughout the total 6 days are outlined in Figure 1. The majority of antibiotics were given via the intravenous route (58.4%). The majority of prescriptions complied with local prescribing guidelines (59.5%). The rationale behind choosing not to adhere to clinical practice guidelines was not documented in 37.2% of the cases.

Prospective follow-up

Follow-up data were collected as a secondary objective to determine the appropriateness of antibiotic utilization during the hospital stay in patients who stayed at least

two days in the hospital and received at least two antibiotic doses on those days. Pre/post-culture and susceptibility results was taken into account. A total of 46 prescriptions were tracked over the two-week period. 95.7% (44/46) of cases were deemed to have an appropriate follow-up measure. In fact, antibiotics were appropriately streamlined or discontinued after culture results came out or after the patients' clinical improvement. Also, antibiotics were reasonably escalated for broader-spectrum empiric antibacterial coverage or upon clinical deterioration. Only two inappropriate measures were reported where an antibiotic was continued or switched to another antibiotic with no clear indication or rationale. Table 2 summarizes the appropriateness of the measures assessed during the follow-up period.

Table 2 Prospective sub-analysis with follow up based on pre/post culture and susceptibility results

Measure	N=cases	Appropriateness	
		Yes	No
Culture results positive targeting specific organism (whether sensitivity results are available or not)	14	14	0
Culture results pending or negative; antibiotic escalated/de-escalated after clinical improvement/deterioration or hemodynamic instability	8	8	0
Culture results negative or clinical improvement; antibiotic discontinued	5	5	0
Antibiotic switch from IV to PO	1	1	0
Patient discharged; antibiotic to be continued at home as per documentation in medical chart	2	2	0
Antibiotic course completed based on previous sensitivity results or clear indication; patient discharged	10	10	0
Antibiotic continued with no alteration in regimen	4	4	0
Antibiotic continued or antimicrobial switching with no clear indication or rationale	2	0	2
Total	N=46	95.7%	4.3%

Table 3 PDSA tool for the test of change

<p>Aim: To further improve patient outcomes and optimize healthcare</p> <ul style="list-style-type: none"> • First test of change: To expand the current ASP at NCCCR to include educational components to determine the best ways to address gaps and barriers to judicious antibiotic use (in particular proper documentation in healthcare records) • Person responsible: Research team • When to be done: After briefing on the results of phases 1 and 2 during medical rounds • Where to be done: On-spot educational intervention at NCCCR during medical rounds 	
<p>Plan:</p> <ul style="list-style-type: none"> • Tasks needed to set up this test of change: Repeat an antibiotic audit to be compared with results obtained from the pre-intervention phase • Person responsible: Research team • When to be done: After the educational intervention • Where to be done: At NCCCR • Predict what will happen when the test is carried out: Documentation will improve • Measures to determine if prediction succeeds: Analyzing data using descriptive statistic 	<p>Do: What actually happened when we ran the test:</p> <ul style="list-style-type: none"> • Most practitioners were receptive to feedback and were keen to know about the results of the first phase of our study • Some practitioners were conservative regarding the results • Practitioners were willing to improve documentation in healthcare records
<p>Study: Describe the measured results and how they compared to the predictions:</p> <p>Phase 3: Tracking changes and outcome measures*</p> <p>*Please refer to the results section</p> <p>Phase 4: Qualitative thematic analysis</p> <p>A. Facilitators and barriers for appropriate antibiotic prescribing and use</p> <ul style="list-style-type: none"> • Several components as perceived by the pharmacists interviewed served both as facilitators and barriers; These included: collaboration and communication among multidisciplinary teams, adherence and compliance to policies and guidelines • An important facilitator agreed upon all pharmacist interviewed was the interventions done by them • Another barrier discussed relates to some electronic system errors <p>B. Strategies to overcome barriers as recommended by pharmacists</p> <ul style="list-style-type: none"> • Educational sessions and morning reports to highlight upon continuous improvements in antibiotics' use and the benefits of consulting the AMS team • Proper communication among multidisciplinary teams and healthcare providers • Implementation of an official AMS policy to be adhered to • Adherence to pre-approved local antibiotic policies and guidelines • Having alternative antibiotic options in instances of drug shortages • Online AMS training courses for involved healthcare members • Campaigns to raise awareness regarding proper antibiotic prescribing and AMS 	<p>Act: Describe what modifications to the plan will be made for the next cycle from what you learned:</p> <p>Targets for improvement</p> <ul style="list-style-type: none"> • The educational component as part of enhancing ASPs had to be assessed from the pharmacists' perspectives • All pharmacists agreed that educational sessions and awareness campaigns are necessary and shall involve all multidisciplinary teams to be conducted by AMS experts on a regular basis regarding antibiotic use and prescribing in hospital settings • All pharmacists thought that focus-group educational sessions are more useful than on-spot educational interventions during multidisciplinary rounds as teams change on a regular basis and it is better to educate all groups at once • All pharmacists thought that this can be arranged during morning reports or by invitation to a private educational session • All pharmacists do believe that the impact of education to overcome barriers takes time and changes to be seen and achieved require rigorous efforts from all healthcare members of the multidisciplinary teams

Phase 2: Feedback using an educational intervention

Several recommendations and targets for improvement in antibiotic use and prescribing behaviours emerged after analysing the results of phase 1 of our study. The main focus was on proper documentation in electronic health records, which helps improve collaboration between healthcare practitioners. Making such information accessible will further help ensure that antibiotics are used properly, modified as needed, and discontinued in a timely manner. In fact, we put emphasis on the appropriate documentation of: indication of the antibiotic based on local prescribing policies or international guidelines (whenever it is recommended to start or continue an antibiotic); rationale behind not adhering to guidelines when applicable; intended duration of treatment course (automatic stop order in CERNER® vs. actual intended duration); indication for prophylaxis; and the reason behind

stopping, discontinuing, changing, or adjusting a current antibiotic based on culture and sensitivity results or patient's actual condition. In order to address the aforementioned recommendations, an on-spot educational intervention was developed.

Phase 3: Tracking changes and outcome measures

Sixty-four medical records were assessed for inclusion in the repeated audit. Twenty-four records were only reviewed as patients in those records were receiving at least one antibiotic on the day of the study audit. Documentation in electronic health records was sub-optimal. In 60% of the cases where there was proper documentation, the rationale behind adjusting a treatment regimen based on sensitivity results, or even stopping an antibiotic because of no clear indication was documented by clinical pharmacists. Table 3 summarizes the results of phase 3.

Table 4 Documentation in healthcare records (indication, duration of therapy, antibiotic treatment plan/change rationale) post the educational intervention

Documentation just for clinical indication	N=5 (20.8%)
No documentation	N=4 (16.7%)
Complete documentation	N=15 (62.5%)
• Due to intervention made by clinical pharmacist	• N=6 (40.0%)
• Documentation by physician	• N=9 (60.0%)
Total	N=24 (100%)

Phase 4: Qualitative thematic analysis

A total of three pharmacists who witnessed the educational intervention participated in the semi-structured interviewing process. All pharmacists were females and practice at NCCCR as members of infectious diseases, haematology and oncology multidisciplinary teams. Two major themes relating to AMS were identified throughout the interviews: facilitators and barriers. Recommendations to overcome perceived barriers were also interpreted as a sub-theme. Table 4 summarizes the results of phase 4.

Discussion

The results of our PPSs showed some improvement in AMS practices compared to a previous study (19), which signals a culture of AMS may be developing at our institution. However, a gap was exposed in terms of the documentation available for clear understanding of antibiotic prescribing practices. These results are important, as our institution recently switched to an electronic healthcare record system. As documentation practices differ from previous handwritten notes in medical charts, our results and interpretations are likely very relevant to other centers undergoing similar changes.

While documentation emerged as the area with the most room for improvement in our study, its implications are controversial. Also, we cannot directly judge that 62.5% of cases had proper documentation because of our educational intervention. This might be possibly due to the Hawthorne effect (26). The importance of this issue is still an area of debate, especially that there is no well-established evidence in primary literature that requires clinical practitioners to document their rationale behind adhering or not to widely adopted clinical practice guidelines (27). However, best practices should advocate for detailed documentation in the patient medical file. By doing so, decision-making becomes transparent and can be followed and understood throughout transition points in care and also transition of prescribers.

Another important finding emerged from our follow-up period that occurred immediately after the PPSs. Specifically, clinical pharmacists documented the rationale for the majority of documented antibiotic therapy decisions and interventions. Clinical pharmacists, as members of the multidisciplinary team, are essential leaders of antimicrobial stewardship programmes due to their expertise in drug therapy, and influencing the

antibiotic misuse within hospital settings (28–30). Our results support their role on AMS services and specifically support advanced roles that include documentation in the patient healthcare record. As such, team communication can be facilitated and seamless care will be ensured.

The interventional portion of our study aligns with research from other centres. Previous studies carried out in the United States of America, Canada, and Europe showed the importance of antimicrobial stewardship quality improvement tools (such as the PDSA cycles-based educational interventions) in increasing rates of appropriate antibiotic use and the compliance with antibiotic prescribing policies and guidelines (31–33). We attempted to use this model to improve documentation practices. The educational messages were received positively yet impacts on practice are still unclear. Achievement of practice change can be very difficult, especially with rotational staff and frequent addition of medical residents and fellows to multidisciplinary teams. Therefore, it is likely that repeated educational interventions might be required to promote a culture of change and embed good documentation habits within the practice culture.

The final analysis of facilitators and barriers can help us learn from this experience and provide insight for other institutions attempting to implement similar interventions. First, communication was identified as both a facilitator and a barrier. As all education is based on communication, those completing the intervention must be good communicators and have experience discussing clinical practices with multidisciplinary teams. Secondly, clinical pharmacists believed that clinical pharmacist interventions are well received and that these team members can promote proper use of antibiotics. Thirdly, the use of an electronic health system with automatic prescription durations and renewals was seen as a barrier to AMS. This point stresses the need for better documentation of therapy plans (including intended duration of therapy), in order to optimize practices at transition points in care. By considering these three key points, it is likely that uptake of AMS interventions can be increased.

Several limitations should be highlighted upon in our study. First, all patients audited in this study had a primary diagnosis of cancer, an immunocompromised condition. Thus, utilization of antibiotics administered in different populations cannot be generalized and does not reflect all antibiotic-prescribing behaviours throughout

Qatar. Secondly, it was a single centre study but it is likely that the interpretations of our data are relevant to other centres. Lastly, results were descriptive in nature due to the challenges identified in comparing practices that occurred before and after our intervention. Specifically, we could not rule out a high risk of confounding if statistical comparisons were made. However, the descriptive snapshots provide rich data that allows for great insight into AMS implementation within our center.

Conclusions

Our findings show that antimicrobial stewardship measures have slightly improved over the last three years at our institution. However, clinicians are still not following prescribing guidelines at all times. Also, our findings expose a gap that clinicians are not consistently documenting the rationale for the use of antibiotics in the medical records and that educational interventions could be considered as an interventional strategy for future

improvement. We recommend open forum discussions and weekly review meetings to address malpractice with continuous efforts to improve documentation, in order to facilitate communication among healthcare team members. Facilitators to this practice change can include improved team communication and inclusion of clinical pharmacists on multidisciplinary teams. Our results also suggest that practice changes take time and cannot be expected after one educational intervention. Therefore, educational programs should be longitudinal, repetitive, and based on specific individual and/or institutional observed behaviors. Future studies should be designed to assess such programs and the ability of ASPs to create a culture of continuous quality improvement.

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Implications en matière de pratiques de prescription suite à une intervention de gestion des antimicrobiens dans un hôpital universitaire de soins tertiaires au Qatar

Résumé

Contexte : Le mauvais usage des antibiotiques constitue un problème de santé publique à l'échelle mondiale ; il est associé à une hausse de la morbidité, à un allongement du temps d'hospitalisation, à une augmentation de la mortalité et des coûts des soins de santé, et surtout à la résistance aux antibiotiques.

Objectifs : L'objectif de la présente étude était de mesurer la conformité des prescriptions d'antibiotiques avec les directives nationales, d'évaluer la façon dont les interventions éducatives peuvent être utilisées au mieux pour avoir un impact et combler les lacunes en vue d'une utilisation optimale des antibiotiques, et d'identifier les facteurs favorables et les barrières à la mise en œuvre de programmes de gestion des antimicrobiens au Qatar.

Méthodes : Six vérifications de référence transversales de la prescription d'antibiotiques ont été conduites sur une période de deux semaines dans un hôpital universitaire de soins tertiaires. Nous avons ensuite procédé à une sous-analyse des prescriptions ainsi qu'à un suivi des comportements de prescription. Une intervention éducative reposant sur la méthode PDCA (planifier-développer-contrôler-ajuster) a été mise en œuvre afin de combler les lacunes identifiées. Une deuxième série de vérifications a été conduite afin d'évaluer l'impact du changement. Enfin, des entretiens ont été menés afin de reconnaître les facteurs favorables et les barrières perçus pour la mise en œuvre de programmes de gestion des antimicrobiens, d'identifier des stratégies pour faire tomber ces barrières, et d'évaluer l'efficacité des interventions éducatives.

Résultats : La neutropénie fébrile était l'indication la plus courante pour la prescription d'antibiotiques (20,7 %). La classe d'antibiotiques utilisée le plus fréquemment était celle des carbapénèmes (21,4 %). Soixante pour cent des prescriptions étaient conformes aux lignes directrices. Les raisons qui justifiaient le non respect de ces dernières n'étaient pas documentées dans 37,2 % des cas. Notre intervention se concentrait également sur la documentation sous-optimale des comportements en matière de prescription dans les dossiers médicaux. Une légère amélioration a été notée dans ce domaine lors de l'intervention post-vérification. Les facteurs favorables et les barrières incluaient : la collaboration et la communication entre les équipes, la conformité avec les lignes directrices, les interventions documentées par les pharmaciens cliniciens, et les erreurs de systèmes électroniques.

Conclusions : Une communication efficace, une documentation constante des comportements en matière de prescription dans les dossiers médicaux, et la formation continue des personnels encouragent une prescription rationnelle des antibiotiques et renforcent les programmes de gestion des antimicrobiens.

تداعيات الممارسة لتدخل إداري لمضادات الميكروبات في أحد المستشفيات التعليمية للرعاية الثالثة، قطر

زياد نصر، علياء بابكر، مروة البشير، عائشة عثمان، شيرين العزازي، كايل ويلي

الخلاصة

الخلفية: يُعدُّ سوء استخدام المضادات الحيوية مشكلة عالمية تواجه الصحة العامة، وترتبط بزيادة المراضة، وطول مدة الإقامة في المستشفى، والوفاة، وتكاليف الرعاية الصحية، ومقاومة المضادات الحيوية على وجه الخصوص.

الأهداف: هدفنا إلى تقييم امثال وصف المضادات الحيوية للمبادئ التوجيهية الوطنية، وتقييم أفضل استخدام لتدخلات التوعية لإحداث أثر ملحوظ ورأب الفجوات في الاستخدام الأمثل للمضادات الحيوية، وتحديد العوامل المسيرة والعوائق أمام تنفيذ برنامج إداري لمضادات الميكروبات في قطر.

طرق البحث: أجريت ست عمليات تدقيق أساسية مقطعية لوصف المضادات الحيوية على مدار أسبوعين في أحد المستشفيات التعليمية للرعاية الثالثة. وتم اتباع نهج التحليل الفرعي للوصفات الطبية مع المتابعة. وطبق تدخل للتوعية باستخدام أداة PDSA (التخطيط-الفعل-الدراسة-الإجراء) لتناول الثغرات المحددة. وتكرّر إجراء عملية التدقيق لتقييم تأثير التغيير. وأخيراً، أجريت مقابلات لتحديد العوامل المسيرة والعوائق الملموسة أمام تنفيذ برنامج إداري لمضادات الميكروبات، وتحديد الاستراتيجيات اللازمة للتغلب على العوائق، وتقييم فاعلية تدخلات التوعية.

النتائج: أكثر العلامات شيوعاً لوصف المضادات الحيوية هي قلة العدلات الحموية (٧، ٢٠٪). وأكثر فئة يتكرر استخدامها من المضادات الحيوية هي مضادات كارباينيم الحيوية (٤، ٢١٪). ويتوافق ستون بالمائة من الوصفات الطبية مع المبادئ التوجيهية. ولم يُوثق السبب الجوهرى وراء اختيار عدم الالتزام بالمبادئ التوجيهية في ٢، ٣٧٪ من الحالات. وتم استهداف التوثيق دون المثالي في السجلات من خلال التدخل الخاص بنا. وأوضحت عملية التدقيق في ما بعد التدخل تحسناً طفيفاً في التوثيق. وشملت العوامل المسيرة والعوائق: التعاون والتواصل بين فرق العمل، والامتثال للمبادئ التوجيهية، والتدخلات الموثقة من قبل الصيدلة السريريين، وأخطاء النظام الإلكتروني.

الاستنتاجات: يساعد التواصل الفعال، والتوثيق المستمر في السجلات، والتوعية المتكررة في تعزيز وصف المضادات الحيوية على نحو معقول ويُحسّن من تنفيذ برنامج إداري لمضادات الميكروبات.

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The translation and cultural adaptation validity of the Actual Scope of Practice Questionnaire

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Abstract

Background: Information on the scope of nursing practice is urgently needed in the Eastern Mediterranean region to help policy makers and directors of nursing develop informed workforce plans.

Aims: This study aimed to validate the Arabic translation and cultural adaptation of the Actual Scope of Practice Questionnaire (A-ASCOP).

Methods: The process of translation and cultural validation adhered to WHO guidelines. The process involved forward translation, review by an expert panel, back-translation, pre-testing and cognitive interviewing.

Results: The clarity, meaningfulness and relevance of the first Arabic version of the A-ASCOP has been validated.

Conclusion: Subject to psychometric analysis, the A-ASCOP is suitable for use in Lebanon and countries of the Middle Eastern region.

Keywords: scope of practice; nursing; validity; transcultural; translation

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Introduction

Every healthcare profession has a scope of practice that determines the activities a member is authorized to perform subject to sufficient education and a current license to practice. The scope of nursing practice encompasses activities with a wide range of complexity that varies according to patients' physical, emotional, psychological and spiritual needs. The boundaries of nursing practice are usually set by a law that regulates the profession, commonly referred to as a "Practice Act". Studies have shown that patient safety quality of care, and cost-effectiveness are compromised when nurses perform activities beyond their knowledge and experience and when they are not permitted to work to their full scope of practice (1-3). Valid and reliable measures of the actual scope of nursing practice are required if policy-makers and nursing directors are to deploy the current workforce efficiently and plan effectively for the future.

In the Eastern Mediterranean Region (EMR) there is no Arabic instrument that measures the frequency of nursing activities and their levels of complexity. However, the Actual Scope of Nursing Practice questionnaire (ASCOP), developed by D'Amour et al. (4) following an extensive literature search and review of international regulatory requirements, may be suitable for use in the EMR. The ASCOP was developed in French and is also available in English, but this is the first Arabic version of the questionnaire. We used the Arabic version of the ASCOP, the Arabic Actual Scope of Nursing Practice Questionnaire (A-ASCOP), to survey nurses throughout Lebanon to determine their scope of practice and to

identify whether they were working within or beyond the scope of practice appropriate to their level of nursing education. The purpose of this article is to describe how the A-ASCOP was developed.

Background

The 1997 nursing law referred to as Decree 1655 (5) distinguishes between three nursing levels: the "Professional Nurse" who is a holder of a Bachelor of Science in Nursing (BSN); the "Nurse", holder of a Baccalaureate Technique (BT) (3 years technical programme post 9th grade); and the "Nurse Assistant" who is trained in a hospital or a nursing school for 1 year (Appendix A). The same law was amended in 1982 to allow nurses holding a Technique Supérieur (TS) degree [3 years technical programme post BT] to work as "Professional Nurse". The functions executed by each category are delineated in decree 1655 as amended by Law # 82/10. Decree 1655 is outdated because it does not refer to advanced nursing practice and does not differentiate clearly between the functions of the "professional nurse" (BS or TS) and those of the "nurse" (BT). Some hospitals are employing BT nurses to work as practical nurses, and others are employing them to work as registered nurses (Appendix B). This ambiguity in functions leaves nurses in Lebanon prone to over-utilize or under-utilize their skill sets.

Lebanese nurse leaders have responded to the omissions and ambiguities in Decree 1655 by drafting an updated practice act with three categories of nurse delineated by level of preparation: nurse specialist (Master of Science in Nursing), nurse (Bachelor of Science in Nursing), and nurse assistant (Baccalaureate

Technique Certificate). The draft updated decree lists nursing activities corresponding with the three levels of preparation (6). Neither the updated practice act, nor the draft qualification and specific scopes of nursing practice have been approved due to the political situation in the country. Currently, the Order of Nurses in Lebanon (ONL) is in the process of refining the qualifications and job specifications of the three categories in the draft updated practice act.

The A-ASCOP will help the ONL to identify the activities undertaken most frequently by each category of nurse in Lebanon. The data will be used to develop a comprehensive scope of practice for nurses in Lebanon that will contribute to patient safety and cost-effective use of the nursing workforce.

Methodology

Instrument of Data Collection

The ASCOP questionnaire includes 26 activities rated on a six category Likert-type scale (1: Never; 2: Very rarely; 3: Sometimes; 4: Frequently; 5: Almost always; 6: Always). The activities are clustered into six dimensions covering the full scope of nursing practice as follows: Assessment and care planning, Patient and family teaching, Care coordination and communication, Staff integration and supervision, Patient safety and quality of care, and Updating and utilization of knowledge. These activities were grouped into three levels of complexity by a panel of expert nurses (4). Level 1 or low complexity activities are those any RN including a beginner is expected to perform. Level 2 or moderately complex activities are those expected of an experienced RN irrespective of level of professional education. Level 3 or high complexity activities are those expected to be performed by an experienced RN holding a BS degree (4).

The original English instrument was tested in 11 Canadian hospitals with 285 nurses working in 22 medical units. The internal consistency and validity testing showed a 0.89 alpha coefficient for the 26 items together, and a range of 0.61 to 0.70 for individual dimensions. The Principal Component Analysis for each dimension revealed 40% and 62% explained variances, indicating the coverage of each dimension by the component items (4).

Adapting the ASCOP for use in Lebanon was a first step in conducting a national study of the organization of nursing work in Lebanon and the impact of the organization of nursing work on the health of nurses. The study was approved by the Institutional Review Board of the American University of Beirut, and the Order of Nurses in Lebanon. WHO guidelines for the translation and adaptation of instruments were followed (7). The process involved forward translation, an expert panel, back-translation, pre-testing and cognitive interviewing. Permission to use and translate the ASCOP instrument was obtained from Dr D'Amour by e-mail correspondence. Translation and cultural validation of the A-ASCOP took place in two phases between August 2014 and March 2015 (Figure 1).

Phase I Translation, expert panel endorsement, and back translation.

First, the questionnaire was translated into Arabic by the first author who is a bilingual (Arabic/English) experienced healthcare professional and administrator. Second, a bilingual expert panel (faculty members teaching in the Nursing Administration track and Master's degree nurses working as research assistants) convened to review and correct the draft version of the A-ASCOP. Third, the A-ASCOP as amended by the expert panel was translated back into English by an independent bilingual nurse academic who is experienced in translating measurement scales into English, but had no prior knowledge of the ASCOP.

Phase II cultural validation.

Twelve nurses from different geographical and educational backgrounds were recruited for individual cognitive interviews conducted to validate the cultural appropriateness of the A-ASCOP. A graduate nursing student trained by a senior faculty in cognitive interviewing recruited interviewees when they visited the Order of Nurses in Lebanon (ONL) to pay their annual registration fees. The cognitive interviews were conducted at a private office at the ONL.

The cognitive interviews included a verbal probing method (to ask specific questions after the participant answers in order to seek further information) that entailed the following steps: Each item in the questionnaire was revisited with every participant for clarity of content and structure. The interviewer starts by reading the questions and response options exactly as they appear in the questionnaire. After the respondent answers, the interviewer record on a separate version of the questionnaire whether the respondent: (a) needed the interviewer to repeat any part of the question, (b) had any difficulty in choosing the answer options, or (c) asked for clarification. In case of a "yes" on any of those questions, the interviewer asks the respondent whether he/she think there is a better way to formulate or rephrase the question (Table 1). This method helps identify whether expressions that were translated with difficulty have equivalent cultural meaning with the original ones (8,9).

Data Analysis

After each interview, the interviewer summarized the comments of the interviewee under each question. The interviewer and the first author then met to discuss the comments and describe the information taken into account before amending the A-ASCOP.

Results

Phase I translation, expert panel endorsement, and back translation

The findings of Phase I of the study clearly indicated that the A-ASCOP was not suitable for use following the initial translation. Of the 26 items, seven items [3,5,6,7,8,13,17]

Table 1 Cognitive interview probing questions

	Yes	No	Comments
Did you need to ask for clarification or qualify your answer?			
Did you have any difficulty using the response options?			
Was there any word you did not understand?			
Did you need to ask for a question to be rephrased?			
In your own words, what does this question ask?			
If it was up to you, how would you rephrase the question?			
Was the question as put easy or hard to answer? Why?			
Is there anything else you would like to say about the questions or the questionnaire?			

confused the participants and did not preserve the meaning of the original ASCOP questionnaire. Although properly translated, five of the remaining items [2,4,9,10,15] needed to be rephrased (Figure 1). The Expert Panel met with the first author to consider alternative phrasing of the 12 items that required revision, including rewording suggested by the participants. Amendments were made to the items that required improvement. Consensus was achieved on the rewording of all 12 items. The revised version of the A-ASCOP was approved by IRB on 6 November, 2014.

Phase II cultural validation

The sample consisted of eight registered nurses and four practical nurses. Five of the participants had a Bachelor of Sciences (BS) in nursing, three had Technique Supérieur (TS), two had Baccalaureate Technique (BT), and two participants had Brevet Pratique (BP) [an assistant nurse with 1 or 2 years training programme after 9th grade]. The sample was recruited from diverse locations of Lebanon; four nurses work in the south, three in Beirut, two in the north, and three at locations on Mount Lebanon. The

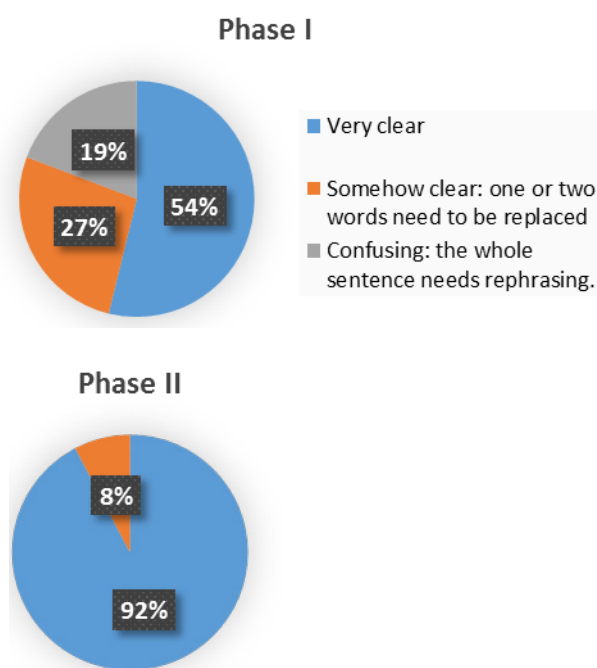
Figure 1 Gantt Chart Activities Time Line, August 2014 –March 2015

Study Phases	2014					2015		
	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar
Phase 1								
1.1. English ASCOP translated into Arabic (first draft of the A-ASCOP)	█							
1.2. IRB approval		█						
1.3. Expert panel input (first cycle)			█					
1.4. Back translation of the A-ASCOP into English			█					
1.5. A-ASCOP updated on the basis of 1.4				█				
1.6. IRB approval of updated A-ASCOP				█				
Phase 2								
2.1. Cognitive interviews						█		
2.2. Expert panel input (second cycle)							█	
2.3. IRB approval of final version of the A-ASCOP								█

Table 2 Unit of analysis, data collection methods, and tools

		Phase 1: Translation and Back translation	Phase 2: Focus Group Discussion
Outcome of Interest	Percent of unclear items reported	Expert feedback	Nurses responses
Unit of Analysis	Questionnaire Items	Faculty & clinical practitioners	Registered & Practical Nurses
Data collection method	Checklist	Checklist	Cognitive interviews + Checklist
Data collection tool	ASCOP questionnaire	ASCOP questionnaire	ASCOP questionnaire
Sample	26 questionnaire items	5 Experts	12 nurses

Figure 2 Percent of unclear items



age of the participants ranged between 20 to 40 years, thereby providing input from nurses with different levels of nursing experience. Ten participants reported that A-ASCOP questions were very clear and did not need further amendment. Of the two participants who thought further amendment was required, one commented on items 11 and 21; the other on item 21 only (Figure 2). Suggested changes to the wording of items 11 and 21 were reviewed by the Expert Panel. The Expert Panel achieved agreement on the rewording of items 11 and 21 by consensus. The IRB approved the final version of the A-ASCOP (Appendix A) on March 16, 2015.

Discussion

Optimal nursing care requires a thorough assessment of patients' needs, appropriate selection of nursing interventions, and continuous monitoring and evaluation of patient status. In addition, nurses are required to coordinate and carry out treatments requested by other healthcare professionals, mainly physicians. The six dimensions of the ASCOP questionnaire address all the above mentioned nursing activities; for that reason it was adopted, translated, and culturally adapted to measure the actual scope of practice of Lebanese nurses.

The original ASCOP instrument targeted registered nurses (RNs) while the Arabic version was designed to be answered by nurses with different educational backgrounds (lower, at, or higher than RN position). All those involved in the translation and cultural validation of the A-ASCOP, including the participants were recruited for their bilingual competency and their expertise in the field of nursing education and practice. They were challenged to adopt clear, simple, and concise terms Arabic terms that could be understood by a nurse with any level of professional preparation. Accordingly, the cognitive interview sample included participants with typical levels of nursing preparation in Lebanon to make sure that all the items could be readily understood by nurses recruited for surveys of the actual scope of nursing practice in the region. The validation process of using a combination of steps (translation, panel input, back translation, and cognitive interviewing) assured multiple evaluations of both the semantic and idiomatic equivalence of the English and Arabic version.

A limitation of the translation and cultural validation process is that the sample size for the cognitive interview component was a small sample. However, similar small samples have been used in comparable studies (10). The second limitation is that the A-ASCOP cannot be properly validated without psychometric analysis. Our Arabic version of the scale has undertaken thorough psychometric analyses by the authors and the results will be published.

Conclusion

The Arabic version of the ASCOP questionnaire is a culturally adapted instrument that can be used to measure the actual scope of practice of Arabic speaking nurses working in short-term hospitals, subject to psychometric validation. It may also be valuable for any Middle-Eastern nurse administrator or policy maker who wants to update job descriptions and scope of practice guidelines for the nursing workforce. Investigators in the Region are encouraged to join us in conducting surveys with the A-ASCOP to examine its psychometric characteristics and applicability to nurse deployment and nurse workforce planning.

Funding: None.

Competing interests: None declared.

Appendix A

استبيان "نطاق ممارسة المهنة"
دامور وآخرون: (٢٠١٢) ترجمة لينا يونان
المهام التمريضية في القسم حيث تعمل:

الهدف من هذا الجزء هو الحصول على فهم أفضل للعمل الذي تقوم به في القسم حيث تعمل. عند كل جملة، يرجى اختيار الاجابة الأكثر تطابقا مع ما تقوم به يوميا في عملك.

دائما	تقريبا دائما	معظم الاحيان	احيانا	نادرا جدا	اطلاقا	
6	5	4	3	2	1	أشارك المريض و اهله فيما يتعلق بخطة العناية التمريضية
6	5	4	3	2	1	أستخدم مقاييس لتحديد المشاكل الصحية) مثل مقياس الألم، وأداة تقييم الجرح (لوضع خطة العناية التمريضية.
6	5	4	3	2	1	أشارك في تطوير العناية التمريضية.
6	5	4	3	2	1	أثابر على تحديث معلوماتي
6	5	4	3	2	1	استخدم استراتيجيات التثقيف الصحي التي تتكيف مع كل مريض وأسرته وفقا لمستوى قدرة المريض في التحكم الذاتي
6	5	4	3	2	1	أقوم بتدريب و تعليم الموظفين الجدد
6	5	4	3	2	1	أبلغ عن الحالات السريرية التي تعكس تقصير في جودة وسلامة الرعاية
6	5	4	3	2	1	أشارك في اجتماعات و أنشطة أعضاء الفريق الصحي
6	5	4	3	2	1	أشارك في توجيه و تدريب طلاب التمريض
6	5	4	3	2	1	أقيم المعلومات الخاصة و الحاجات التعليمية لكل مريض وأسرته
6	5	4	3	2	1	انني معني/ة في تصميم و تطبيق و تحديث برامج تمريضية خاصة لأمراض معينة
6	5	4	3	2	1	أنسق عمل فريق التمريض لتلبية احتياجات المريض و أهله
6	5	4	3	2	1	أشارك فريق التمريض المعلومات المنبثقة عن البحوث العلمية
6	5	4	3	2	1	أشارك في تطوير و تنفيذ الأنشطة التدريبية لفريق التمريض، وفقاً لمهاراتي
6	5	4	3	2	1	أنسق الاجراءات المطلوبة للعناية التمريضية مع أعضاء الفريق الصحي المعالج لضمان استمرارية الرعاية
6	5	4	3	2	1	أتواصل مع أعضاء الفريق الصحي المعالج لتقديم كل المعلومات التي يمكن أن تؤثر على تنسيق الرعاية
6	5	4	3	2	1	أقوم بالتأكد من أن المريض و أهله قد فهموا التثقيف الصحي الذي أعطي لهم.
6	5	4	3	2	1	أقوم بتحسين طريقة ممارستي لعملي من خلال الاطلاع على أفضل الممارسات و البحوث في علوم التمريض أو في الصحة.
6	5	4	3	2	1	عندما ألاحظ أي تقصير في العناية التمريضية، أقترح منهجا أو استراتيجية جديدة لتحسين جودة وسلامة العناية
6	5	4	3	2	1	أشارك في تحديد الاحتياجات التدريبية و التعليمية لفريق التمريض في القسم حيث أعمل
6	5	4	3	2	1	أقوم بالتدوين خطياً عن تغيير وضع المريض الصحي أو عن حالة المريض و علاجاته الخطة التمريضية و ملاحظات الممرضات، الخ
6	5	4	3	2	1	أتحقق من جودة التثقيف الصحي المقدم للمريض في القسم حيث أعمل
6	5	4	3	2	1	أشارك في تقييم جودة وسلامة الرعاية
6	5	4	3	2	1	أنقل كل المعلومات المتعلقة بالمريض إلى فريق العناية في المؤسسات الأخرى عند انتقال المرضى اليها
6	5	4	3	2	1	أقوم بتقييم حالة المريض الجسدية و العقلية ، مع الأخذ بعين الاعتبار الجوانب البيولوجية، و النفسية، و الاجتماعية
6	5	4	3	2	1	أشارك في تحديث أساليب العمل لتحسين جودة وسلامة الرعاية

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Appendix B**Functions of Registered nurse and nurse as stated in the Decree1655****Part one: Registered Nurse**

Chapter one: Definition of the Registered Nurse and his/her functions

Article one: Definition of the Registered Nurse

He/she is the person who has completed the study of a basic program in the field of nursing, and became qualified and certified to practice the nursing profession on the Lebanese territory, in view of his/her leadership and planning role in the field of nursing, in addition to his/her capabilities to work as a member in a medical team.

Article two: Functions of the Registered Nurse

- 1 – Exercise nursing duties within the scope of his/her studies, the general and specific nursing regulations, according to his/her abilities and scientific qualifications.
- 2 – Teach nursing students within the field of his work and provide health instructions.
- 3 – Contributing to the implementation of general health policies within the limits of his/her capabilities, responsibilities and functions; and suggest needed nursing services.
- 4 – Participating in the nursing research aiming at the development and advancement of these sciences.

Part two: The nurse

Chapter one: Definition and functions of the Nurse

Article five: Definition of the nurse and his/her functions.

He/she is the person who has received scientific and technical preparation that enable him/her to provide general but not complex nursing care, and who works under the supervision of the registered nurse.

Article six: Functions of the Nurse

- 1-Knows the basic needs required by the people he/she is entrusted with their care.
- 2-Contribute in putting a program for the care of these people, along with his fellow staff.
- 3-Convey correct and accurate observations.
- 4-Implement instructions of the nurse-in-charge or the treating physician, with full awareness and caution.
- 5-Contribute with the other members of the medical body in the care of public health, prevention of disease, and rehabilitation of patients.

Appendix C Dimensions and complexity level of RN activities

Dimensions	Level 1: Low complexity	Level 2: Moderate complexity	Level 3: High complexity
Assessment & care planning	25. I assess the patient's physical and mental condition, taking biopsychosocial aspects into consideration. 21. I regularly update, in writing, information about the patient's condition and the care provided (therapeutic nursing plan, nurses' notes, etc).	1. I involve the patient and the patient's family in care planning. 2. To plan my interventions, I use healthcare problem assessment tools (pain scale, wound assessment tool).	11. I am involved in designing, applying, and updating patient care programs.
Teaching of patients and families	10. I assess the specific information and education needs of each patient and his/her family. 17. I verify that the patient and family have understood the teaching provided.	5. I use teaching strategies that are adapted to each patient and family in accordance with the patient's level of autonomy.	22. I check the quality of patient education provided on the unit.
Communication and care coordination	16. I communicate to members of the team all information that could affect the coordination of care.	12. I coordinate the work of the nursing team to meet the needs of the patient and family. 24. I convey all relevant information to healthcare professionals in other institutions in order to ensure continuity of care.	8. I am involved in Interprofessional team meetings or activities. 3 15. To ensure continuity of care, I coordinate the interventions of the Interprofessional team.
Integration and supervision of staff		20. I am involved in identifying in-service education needs for my unit. 9. I am involved in the orientation and training of nursing students or of newly hired staff.	6. I act as a mentor or educator for newly hired staff. 14. I am involved in developing and conducting training activities for the care team, in accordance with my skills.
Quality of care and patient safety	7. I report clinical situations in which I see deficiencies in quality and safety of care.	26. I get involved in updating practices to improve the quality and safety of care. 19. When I have identified deficiencies, I suggest approaches or strategies to improve the quality and safety of care.	23. I am involved in evaluating the quality and safety of care. 3. I am involved in developing nursing practice.
Knowledge updating and utilization	4. I keep my knowledge up-to-date.	18. I improve my practice based on new knowledge derived from best practices and research in nursing science or in health.	13. I share with the nursing team knowledge emerging from research.

(Adapted from the ASCOPE questionnaire items; D'Amour et al. 2012)

Validité de la traduction et de l'adaptation culturelle du Questionnaire de l'étendue de la pratique infirmière (QÉPI)

Résumé

Contexte : Des informations sur l'étendue de la pratique infirmière sont requises de toute urgence dans la Région de la Méditerranée orientale afin d'aider les responsables politiques et les directeurs de services infirmiers à mettre au point des prévisions relatives aux effectifs du personnel en toute connaissance de cause.

Objectifs : La présente étude avait pour objectif de valider la traduction arabe et l'adaptation culturelle du Questionnaire de l'étendue de la pratique infirmière (QÉPI).

Méthodes : Le processus de traduction et de validation culturelle était conforme aux lignes directrices de l'OMS, et impliquait la traduction initiale, la révision par un panel d'experts, la production d'une rétro-traduction, un test préalable du questionnaire et la réalisation d'un entretien cognitif.

Résultats : La clarté, l'importance, et la pertinence de la première version arabe du QÉPI ont été validées.

Conclusion : Sous réserve de l'analyse psychométrique, le Questionnaire de l'étendue de la pratique infirmière est adapté à une utilisation au Liban et dans les pays de la région du Moyen-Orient.

ترجمة وصلاحيّة التكيّف الثقافي لاستبيان "نطاق الممارسة الفعلي"

لينا يونان، مايكل كلينتون، سهى فارس، هيلين سماحة

الخلاصة

الخلفية: توجد حاجة ملّحة لجمع معلومات بشأن نطاق ممارسة التمريض في إقليم شرق المتوسط من أجل مساعدة راسمي السياسات ومديري التمريض على وضع خطط مبنية على المعرفة للقوى العاملة.

الأهداف: هدفت هذه الدراسة إلى التحقّق من صحة الترجمة العربية لاستبيان "نطاق الممارسة الفعلي" وصلاحيّة التكيّف الثقافي.

طرق البحث: اتبعت عملية التحقّق من الترجمة والتكيّف الثقافي المبادئ التوجيهية لمنظمة الصحة العالمية. وشملت العملية ترجمة النص الأصلي، والمراجعة بواسطة لجنة من الخبراء، والترجمة الارتدادية، والاختبارات المسبقة والمقابلات المعرفية.

النتائج: تمّ التحقّق من صلاحيّة النسخة العربية الأولى من استبيان "نطاق الممارسة الفعلي" كما تمّ التحقّق من مغزاه وصلته بالموضوع.

الاستنتاجات: وفقاً لتحليل القياس النفسي، يُعدّ استبيان "نطاق الممارسة الفعلي" مناسباً للاستخدام في لبنان وبلدان إقليم شرق المتوسط.

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Human development index, maternal mortality rate and under 5 years mortality rate in West and South Asian countries, 1980–2010: an ecological study

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Abstract

Background: Human Development Index (HDI), maternal mortality rate (MMR) and children aged under 5 years mortality rate (U5MR) are fundamental issues, especially in low- and middle-income countries.

Aims: The aim of this study was to evaluate the changes in HDI, MMR and U5MR from 1980 to 2010 in certain West Asian countries as well as the relationship between these indexes.

Methods: In this ecological study, HDI, MMR and U5MR information from studied countries during 1980 to 2010 was extracted from the gap minder site and then analysed using descriptive and analytical methods, including Spearman correlation.

Results: The lowest and highest rates of HDI and MMR in 2010 were seen in the United Arab Emirates and Pakistan (HDI: 0.49, 0.81; MMR: 7.14, 335.45 respectively). HDI is rising in all countries studied, with the highest increase in the Islamic Republic of Iran (0.21). MMR and U5MR saw a decline over the years, with the greatest decrease seen in India, and the lowest and highest child mortality rate in 2010 found in Bahrain and Pakistan (8.3, 91.8 respectively). However, there was a negative relationship between HDI and MMR ($r = -0.7, P < 0.001$).

Conclusions: HDI increased during 1980–2010. The highest rate of HDI decrease was observed in the Islamic Republic of Iran, and the greatest reduction of MMR was seen in India. Also, the highest decrease in U5MR was related to India as well, while MMR and U5MR rate decreased. Hence, improving HDI might have a definite impact on decreasing MMR and U5MR, especially in low- and middle-income countries.

Keywords: maternal mortality, child mortality, Human Development Index, Asia

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Introduction

Maternal mortality as well as deaths during pregnancy, childbirth or within 42 days after delivery remain major challenges for world health systems (1). Maternal mortality rate (MMR) is a sensitive indicator of health conditions and socio-economic development of a society, and forms Goal 5 of the Millennium Development Goals (MDG 5) to reduce MMR by three quarters from 1990 to 2015 (1,2). The global ratio of maternal mortality declined to an estimated 216 deaths per 100 000 live births during 1990–2015, less than MDG 5, and far from the target Sustainable Development Goal (SDG) of a reduction to 70 maternal deaths per 100 000 live births by 2030 (3).

Since 1980, the world health community has taken measures to reduce maternal mortality through a series of initiative actions that began in 1987 with the mothers' safety movement (4). Maternal mortality in the world decreased by more than 40% during 1990–2015, from

532 000 to 303 000 deaths per year (5). In addition to maternal mortality, the mortality of children under 5 years of age (U5MR) has been considered an important indicator of health status and national prosperity in social and biomedical research, and forms the Goal 5 of the Millennium Development Goals (MDG 4) to reduce U5MR rate by two thirds during 1990–2015 (6,7). From 1990 to 2015, the global rate of U5MR declined by more than half and reached 43 per 1000 live births. This was less than MDG 4 and far from the target SDG to end preventable deaths of children under 5 years by 2030 (3,8).

In 2015, it was estimated that 5.9 million children aged under 5 years died (3). Child mortality rate has been widely used as an indicator of equality and human development (9). In 1990, the United Nations Development Programme (UNDP) introduced the Human Development Index (HDI) with the main aim of creating a more comprehensive measure of human development programmes (10,11). The index has three aspects: longevity, knowledge,

and life standards. These three aspects are respectively measured by life expectancy at birth, a combination of adults' literacy and enrollment rate, and Gross Domestic Product (GDP) per capita (12,13). The HDI value is ranged zero to one (14,15). Regarding HDI, countries are divided into three groups: countries with low ($HDI < 0.500$), average ($HDI = 0.500-0.799$) and high ($HDI \geq 0.800$) development status (13). Given the importance of having knowledge concerning maternal and child mortalities in policy-making and planning and also the potential role of development indexes in maternal and child mortalities, the aim of this study was to evaluate the relationship between maternal and child mortalities and HDI in certain West Asian countries.

Methods

Data and variables

The variables in the present study included MMR (per 100 000 births), U5MR (per 1000 births), and HDI of certain West Asian countries, namely: Bahrain, India, Islamic Republic of Iran, Jordan, Kuwait, Pakistan, Qatar, Saudi Arabia, Syrian Arab Republic and the United Arab Emirates from 1980 to 2010; data were extracted from the gap minder's site (16). The HDI is a summary measure that indicates the human development and level of quality of life. This measure calculated from the three sub-indicators that include: life expectancy, education attainment and GDP per capita (17). This measure can be calculated by a simple average of the three mentioned sub-indicators (18).

Sample selection

In this study, the west Asian countries with more complete information (the criteria for completing the information were based on data missing rate) about the variables under study were selected, as well as their similarity in development indices including: economic status, life expectancy and level of education.

Data analysis

The required data were analysed using SPSS 19 software, involving descriptive statistics and analytic methods such as Spearman correlation coefficient (due to nonparametric condition) to assess the correlation between the variables under study.

Results

The highest and the lowest rates of HDI in 2010 were found in the United Arab Emirates (0.81) and Pakistan (0.49) respectively. The results showed that during 30

years HDI has had a growing trend in all countries. The highest HDI growth rate was found in the Islamic Republic of Iran at 0.2 (0.49 in 1985 and reaching 0.70 by 2010). The lowest rate of HDI for the same period was seen in Kuwait (0.10). The lowest MMR was found in the United Arab Emirates (41.11 in 1980 and 7.14 in 2010). The highest MMR was found in Pakistan (746.09 in 1980 and falling to 335.45 in 2010). The results indicate that MMR had been decreasing during the research time period, and the greatest reduction was related to India.

According to the results, U5MR has had a declining trend during the research time period in all the countries. The lowest U5MR was related to Bahrain at 32.35 in 1980 and 8.36 in 2010, while the highest rates were found in India at 167.6 in 1980 and 91.8 in Pakistan in 2010. The highest rates of decrease were found in India and second highest in Islamic Republic of Iran.

The correlation between HDI and MMR, and correlation between HDI and U5MR were calculated as a total (Table 1) and by country (Table 2). There was a negative relationship between HDI and MMR ($r = -0.7$, $P < 0.001$); thus, the increase of HDI would lead to the decrease of MMR. A similar relationship was found between HDI and U5MR ($r = -0.7$, $P < 0.001$) where the increase of HDI followed a significant decrease of U5MR. However, the correlation coefficient between MMR and U5MR was positive and significant ($r = 1.00$, $P < 0.001$). Therefore, MMR and U5MR were closely linked and as MMR increased, U5MR increased as well the trend of the three indices among the West Asian countries (by country and overall) as shown in figures 1 to 5. According to these figures, the highest rate of HDI decrease was observed in Islamic Republic of Iran, and the greatest reduction of MMR was seen in India. Also, the highest decrease in U5MR was related to India as well.

Discussion

In this study we observed a downward trend in MMR from 1980 to 2010. The meta-analysis study showed that during a 28-year period (from 1980 to 2008), MMR had decreased in 181 countries from 422 to 251 in 100 live births (1). In addition, another meta-analysis study indicated that a downward trend of MMR (2.5%) had occurred around the world every year (19). The World Health Organization in collaboration with UNICEF showed that the rates of mortality reduction among women during a 20-year period (1990–2010) were 69% in Eastern Asia, 64% in Southern Asia, and 35% in Central Asia (20). The reason for this downward trend might be the improvement of services and increase of public efficiency and awareness, although the contribution of HDI cannot be ignored, as

Table 1 Correlation between HDI–MMR and U5 Mortality rate from 1980 to 2010 in all studied countries

variables	Correlation coefficient(r)	P value
HDI–MMR	-0.7	<0.001
HDI–U5MR	-0.7	<0.001
MMR–U5MR	1.0	<0.001

Table 2 Correlation between HDI–MMR and U5MR from 1980 to 2010 according to each country studied

Country	Variables	Correlation coefficient(r)	P value
Bahrain	HDI–MMR	-0.99	<0.001
	HDI–U5MR	-0.99	<0.001
	MMR–U5MR	0.98	<0.001
India	HDI–MMR	-0.97	<0.001
	HDI–U5MR	-0.99	<0.001
	MMR–U5MR	0.99	<0.001
Islamic Republic of Iran	HDI–MMR	-0.9	0.01
	HDI–U5MR	-0.97	0.001
	MMR–U5MR	0.97	<0.001
Jordan	HDI–MMR	-0.97	<0.001
	HDI–U5MR	-0.95	<0.001
	MMR–U5MR	0.97	<0.001
Kuwait	HDI–MMR	-0.98	<0.001
	HDI–U5MR	-0.97	0.001
	MMR–U5MR	0.84	0.01
Pakistan	HDI–MMR	-0.90	0.005
	HDI–U5MR	-0.98	<0.001
	MMR–U5MR	0.95	0.001
Qatar	HDI–MMR	-0.99	0.01
	HDI–U5MR	-0.99	0.01
	MMR–U5MR	0.99	0.01
Saudi Arabia	HDI–MMR	-0.98	<0.001
	HDI–U5MR	-0.91	0.004
	MMR–U5MR	0.96	0.001
Syrian Arab Republic	HDI–MMR	-0.99	<0.001
	HDI–U5MR	-0.98	<0.001
	MMR–U5MR	0.99	<0.001
United Arab Emirates	HDI–MMR	-0.99	<0.001
	HDI–U5MR	-0.92	0.003
	MMR–U5MR	0.90	0.005

Figure 1 A comparison between the HDI of West Asian countries from 1980 to 2010

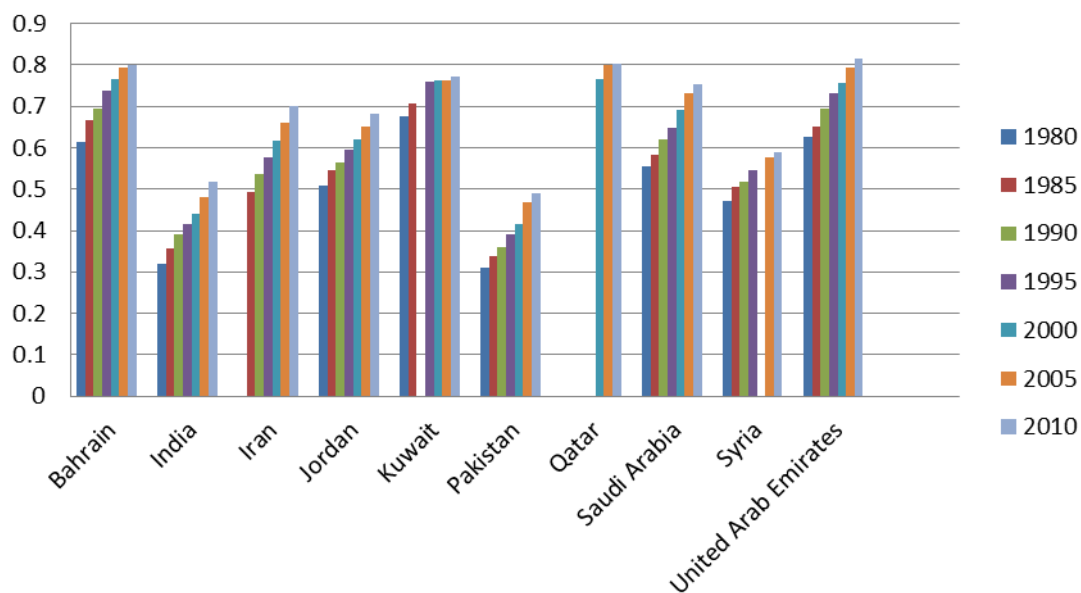


Figure 2 A comparison between the maternal mortality rates in West Asian countries from 1980 to 2010

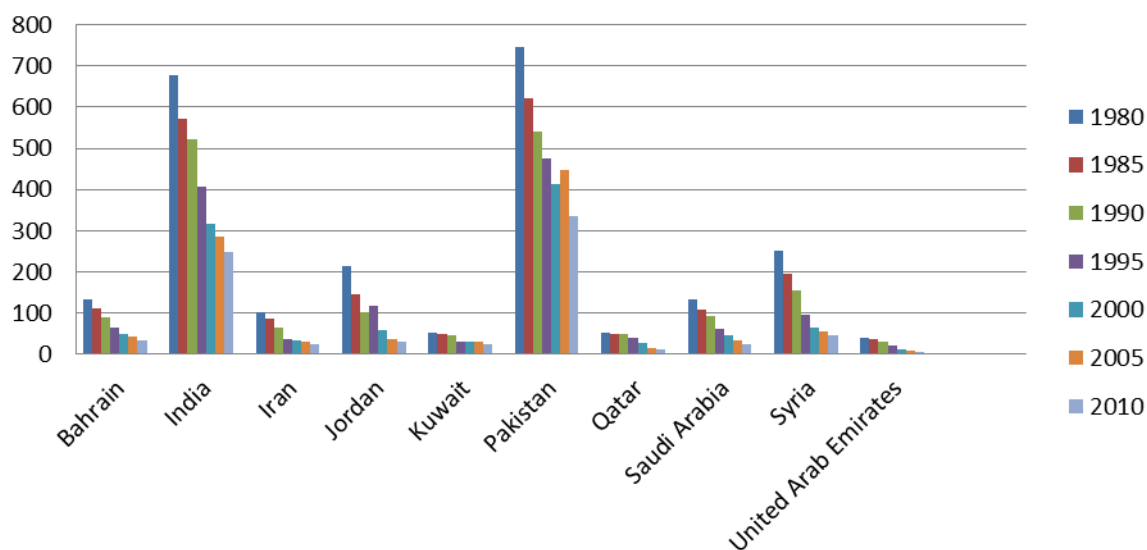
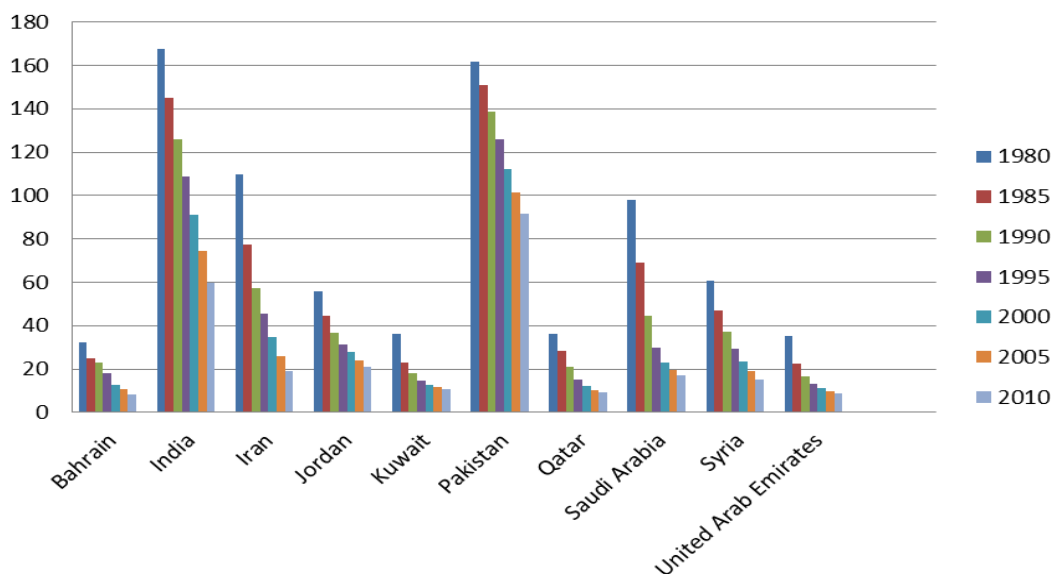


Figure 3 A comparison between the death rates of children under 5 years old in West Asian countries from 1980 to 2010



it seems that the increase of each HDI component (life expectancy, education level and income) might lead to the decrease of MMR. It must also be noted that despite the decline in female mortality in the world, only 16 countries have reached the Millennium Development Goals so far (1). Therefore, there are still some gaps in this regard, and identifying the reason might help solve this problem. Kassebaum stated in 2014 that most maternal deaths had occurred in higher-age groups and in intra-partum or postpartum periods (4). Hence, some interventions and programmes have to be applied for these high-risk groups in countries with high MMR. Also proper antenatal and obstetric care had a great role in decreasing MMR (1).

In the present study, U5MR has had a declining trend. In a French study it was seen that U5MR decreased from 1990 to 2011 in all low- and middle-income countries

and this decrease was influenced by factors such as improvement of health care and economic status (21). A study carried out in 2000 showed that child mortality had had 17.5% decrease worldwide compared to the previous decade, but in some Southeast Asian countries where there are economic problems, the rate of child mortality is still high and as long as economic problems are not controlled, child mortality will remain high (22). A meta-analysis in 2008 showed that 8.795 million child deaths had occurred worldwide among U5MR(6). In our study the highest rate of decrease was related to India (167.6 to 59.9 in 100 live births from 1980–2010) and Iran (109.9 to 19.2 in 100 live births from 1980–2010). It seems that improving maternal education level, increasing age at marriage and birth gap between two births has an important role in decreasing U5MR in India (23). In the Islamic Republic of Iran the role of Iranian PHC system was significant in

Figure 4 Trend of change in overall mean of HDI in all studied countries from 1980 to 2010

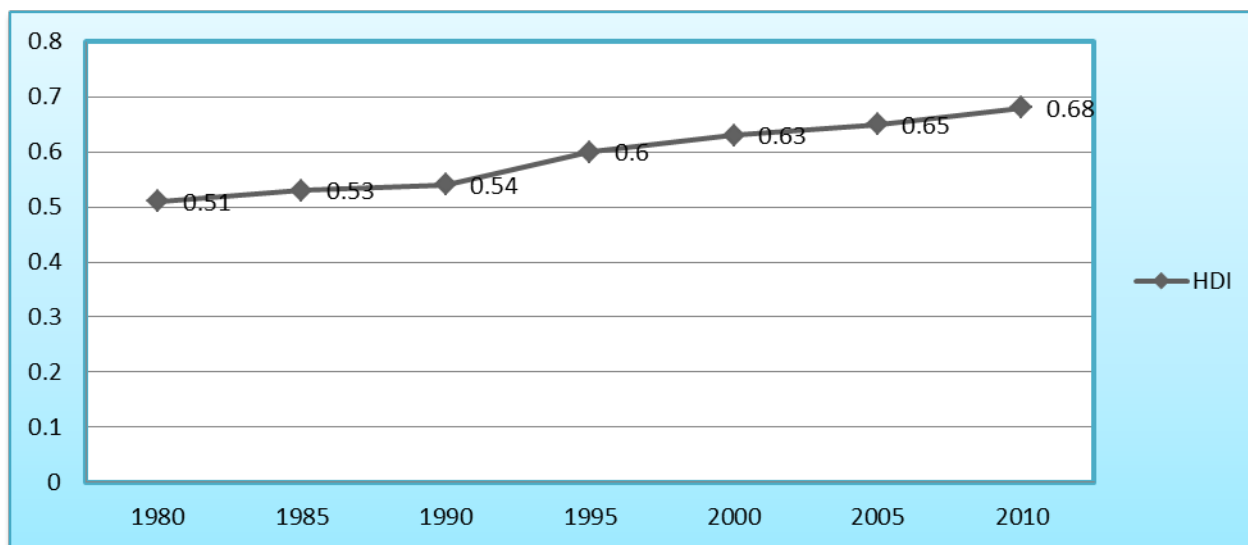
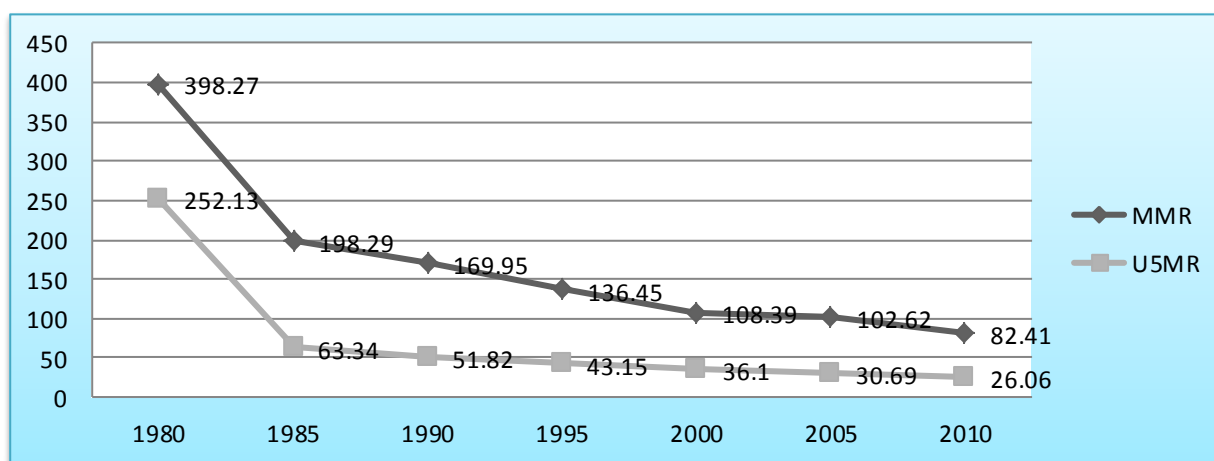


Figure 5 Trend of change in overall mean of MMR and U5MR in all studied countries from 1980 to 2010



this decreasing trend (24). Other reasons for this declining trend are the following: improving community health status, earlier visit of patients, and improvement of diagnostic and therapeutic procedures (25). The current study results showed that there has been an increase in HDI in a 20-year period. Similarly, we can point to Asefzadeh's study that showed 7% increase in HDI during 1990–2008. Furthermore, the average life expectancy had increased during 18 years (1990–2008), rising from 65 to 69 years. During this period, the average income per capita was growing by 31%. In addition, education level growth was 3% during the same period (26). In another study, Jayachandran et al. showed 7.1% increase in life expectancy (27). In our study, the most improvement in HDI was related to the Islamic Republic of Iran due to improving government health expenditure; thus, improving life expectancy, economic growth, and education levels (28).

A significant correlation was seen between HDI and MMR. The data from 188 countries revealed that there was a negative correlation between HDI and its components, and MMR ($r = -0.807$, 95% CI: $-0.853, -0.747$, $P = 0.001$). It was also found that most deaths of mothers could be observed in countries with low HDI and there was a statistically significant correlation between these two factors (29). Another study in 2012 confirmed these results (30).

In addition, there was a reverse relationship between HDI and U5MR. In a study conducted in 2015, the mean years of schooling showed a significant correlation with the decrease of mortality rates. In other words, as education level increased, health literacy of women rose as well. This led to better health, better care of their children and more attention of women to the health of their family, and thus reducing the mortality and morbidity (21).

Limitations

Lack of updated information on studied countries, having incomplete data, and/or the lack of required information in many countries can be mentioned as the limitations of this study. Since it was a cross-sectional study, the causes of the increasing or reducing trend could not be determined. To reduce these limitations, a prospective study is suggested to be designed.

Conclusion

Generally, it was observed that U5MR and maternal mortality rate had a decreasing trend from 1980–2010. One of the most important causes of this decrease was the improvement of HDI; thus, by increasing educational levels, income per capita and life expectancy we might observe a substantial reduction in maternal and child mortality rates.

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Indice de développement humain, taux de mortalité maternelle et taux de mortalité des enfants de moins de cinq ans dans les pays d'Asie de l'Ouest et du Sud, 1980-2010 : étude écologique

Résumé

Contexte : L'indice de développement humain (IDH), le taux de mortalité maternelle (TMM) et le taux de mortalité des moins de cinq ans constituent des éléments fondamentaux, notamment dans les pays à revenu faible et intermédiaire.

Objectifs : La présente étude avait pour objectif d'évaluer les changements survenus eu égard à l'indice de développement humain, au taux de mortalité maternelle et au taux de mortalité des moins de cinq ans entre 1980 et 2010 dans certains pays d'Asie occidentale, ainsi que la relation entre ces différents indicateurs.

Méthodes : Dans cette étude écologique, les informations liées à l'indice de développement humain, et au taux de mortalité maternelle et à celui des moins de cinq ans dans les pays étudiés entre 1980 et 2010 ont été extraites à partir du site Web Gapminder, puis analysées à l'aide de méthodes descriptive et analytique, notamment de la corrélation de Spearman.

Résultats : En 2010, les taux les plus bas et les plus élevés pour l'indice de développement humain et la mortalité maternelle ont été observés aux Émirats arabes unis et au Pakistan (IDH : 0,49 et 0,81 ; et TMM : 7,14 et 335,45 respectivement). L'indice de développement humain connaît une augmentation dans tous les pays étudiés, avec l'augmentation la plus notable en République islamique d'Iran (0,21). Les taux de mortalité maternelle et des enfants de moins de cinq ans ont connu une baisse au fil des années, la plus importante ayant été notée en Inde. En 2010, Bahreïn affichait le taux de mortalité infantile le plus bas (8,3) et le Pakistan le plus élevé (91,8). Néanmoins, il existait une relation négative entre l'indice de développement humain et le taux de mortalité maternelle ($r = -0,7, p < 0,001$).

Conclusions : L'indice de développement humain a augmenté entre 1980 et 2010, tandis que le taux de mortalité maternelle et celui des enfants de moins de cinq ans ont diminué. À ce titre, l'amélioration de l'Indice de développement humain pourrait avoir une certaine influence sur la baisse des taux de mortalité maternelle et des moins de cinq ans, en particulier dans les pays à revenu faible ou intermédiaire.

مؤشر التنمية البشرية، ومعدل وفيات الأمهات، ومعدل وفيات الأطفال دون الخامسة في بلدان غرب وجنوب آسيا،
١٩٨٠-٢٠١٠: دراسة إيكولوجية

يوسف على محمدى، فرزاد خدامرادى، مليحه خرمداد، محمد شهباز، فيروز اسماعيل زاده

الخلاصة

الخلفية: يُعدُّ مؤشر التنمية البشرية، ومعدل وفيات الأمهات، ومعدل وفيات الأطفال دون الخامسة من القضايا الأساسية، لا سيَّما في البلدان منخفضة ومتوسطة الدخل.

الأهداف: هدفت من هذه الدراسة إلى تقييم التغيرات في مؤشر التنمية البشرية، ومعدل وفيات الأمهات، ومعدل وفيات الأطفال دون الخامسة في الفترة بين ١٩٨٠ حتى ٢٠١٠ في بلدان محددة بغرب آسيا، بالإضافة إلى العلاقة بين هذه المؤشرات.

طرق البحث: في هذه الدراسة الإيكولوجية، استُخرجت معلومات مؤشر التنمية البشرية ومعدل وفيات الأمهات ومعدل وفيات الأطفال دون الخامسة المأخوذة من البلدان محل الدراسة في الفترة بين ١٩٨٠ و ٢٠١٠ من موقع للتذكير بالثغرات، ثم جرى تحليلها باستخدام المناهج الوصفية والتحليلية، بما في ذلك معامل ارتباط سبيرمان.

النتائج: وُجِدَ أدنى وأعلى معدلات مؤشر التنمية البشرية ومعدل وفيات الأمهات في عام ٢٠١٠ في الإمارات العربية المتحدة وباكستان (مؤشر التنمية البشرية: ٤٩, ٠, ٨١, ٠؛ معدل وفيات الأمهات: ١٤, ٧, ٤٥, ٣٣٥ على التوالي). ويزداد مؤشر التنمية البشرية في جميع البلدان محل الدراسة، وأعلى زيادة توجد في جمهورية إيران الإسلامية (٢١, ٠). وشهد معدل وفيات الأمهات ومعدل وفيات الأطفال دون الخامسة انخفاضاً على مدار السنوات، حيث يوجد أكبر انخفاض في الهند، ويوجد أدنى وأعلى معدل وفيات الأطفال في عام ٢٠١٠ في البحرين وباكستان (٣, ٨, ٨, ٩١ على التوالي). ومع ذلك، توجد علاقة سلبية بين مؤشر التنمية البشرية ومعدل وفيات الأمهات (معامل الارتباط $r = -0.01$).
الاستنتاجات: ازداد مؤشر التنمية البشرية في الفترة بين عامي ١٩٨٠ و٢٠١٠، بينما انخفض معدل وفيات الأمهات ومعدل وفيات الأطفال دون الخامسة. لذلك، قد يكون لتحسُّن مؤشر التنمية البشرية تأثير مؤكَّد على انخفاض معدل وفيات الأمهات ومعدل وفيات الأطفال دون الخامسة، لا سيَّما في البلدان منخفضة ومتوسطة الدخل.

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Serum 25-hydroxyvitamin D status and wheezing in pre-school children, Kuwait

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Abstract

Background: There has been growing recognition of the critical extra-skeletal roles for vitamin D including lung disease.

Aims: This study was performed to explore the possible role of vitamin D on wheezing occurrence among Kuwaiti pre-school children.

Methods: Out of 244 children from Al-Adan Hospital, Kuwait, 151 cases were enrolled as wheezers while the rest served as controls. The wheezers were subdivided into episodic wheezers (EW) and multiple trigger wheezers (MTW). Detailed history of the wheezing attacks, previous hospitalizations, and intensive care admission were recorded as well as their serum 25-hydroxyvitamin D [25(OH)D] levels.

Results: Serum 25(OH)D was significantly lower in the wheezing group, and its decrease was a risk factor for wheezing. Moreover, serum 25(OH)D was not significantly different between EW and MTW; nevertheless, its low level could be linked to MTW.

Conclusions: Vitamin D deficiency increases the risk of wheezing among preschoolers in Kuwait. A possible link between low serum 25(OH)D and MTW could highlight a specific role for vitamin D in relation to atopy. Prevention and prompt management of vitamin D deficiency should be considered among infants and children with wheezing.

Keywords: asthma, early wheezing, pre-school children, serum hydroxyvitamin D, Kuwait

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Introduction

Vitamin D, whether produced in the skin upon sun exposure or ingested from various dietary sources, is converted in the liver to 25-hydroxyvitamin D [25(OH)D]. The latter is the major circulating form of vitamin D and is thus used for evaluating the vitamin D status of patients (1,2). The flesh of fatty fish (such as salmon, tuna, and mackerel) and fish liver oils are among the best sources of vitamin D and the fortified cereals and milk provide adequate amounts as well (3).

Countries of the Gulf region including Kuwait, have become increasingly modernized, resulting in a transformation of lifestyle based on technology, sedentary activity, lack of sunlight, and unhealthy dietary patterns. These factors have led to a higher prevalence of vitamin D undernutrition (4). The nutritional rickets is multifactorial but one of the most important contributors is insufficient intake of vitamin D (5), which has been reported in many age groups in Kuwait whether university women (6) or high school children (7). Additionally, a recent report describes the inadequacy of early vitamin D supplementation practice by physicians working in Kuwait (8). Regarding vitamin D status in Kuwait, Molla et al. (9) also reported that 40% of their studied mothers and 60% of the neonates were vitamin D deficient on the day of delivery. Recently, low vitamin

D status was still reported among adolescent females in Kuwait (98.7% had a level below 50 nmol/L) (10).

There has been growing recognition of the critical extra-skeletal roles for vitamin D in recent years (11) with an explosion of interest in vitamin D across health disciplines including lung disease (12). Recently, vitamin D was found to be low in patients with recurrent wheezes (13); a problem which was reported to be moderately present among children in Kuwait (14). Recurrent wheeze in young children, either transient or that will continue as asthma, can be severe and cause significant impairment in quality of life, with frequent use of health care systems and great expense (15,16). The aim of this study was to explore the possible impact of vitamin D status on occurrence of wheezing and its pattern among preschool children in Kuwait.

Methods

This cross-sectional study was performed in the outpatient clinics, Paediatric department, Al-Adan Hospital, Al-Ahmadi district, Kuwait, from 1 April 2013 to 31 August 2014. It included 244 Kuwaiti pre-school children (age 2 to 5 years) who presented at the outpatient clinic for vitamin D status evaluation, and were recruited after obtaining consents from the parents or care givers.

Full demographic and social data were collected

from all enrolled subjects. Detailed history regarding previous wheezing episodes, if any, was taken from them. Wheezing status was assessed by asking the same questions to all parents/caregivers: was there wheezing or whistling sound in the chest at any time? Did the child ever need to use inhaled drugs through nebulizer or spacer to relieve cough? Wheezing sounds or difficult breathing? Was he/she ever diagnosed as a wheezer/asthmatic by a doctor? The same questions were asked by one of the principle researchers for all parents or care givers in direct face-to-face interviews to minimize bias and assure strict inclusion and exclusion criteria enforcement.

The children were divided into two groups: the wheezing group that included cases with more than one wheezing attack in the last year, and their physicians confirmed them as wheezers; and the control group, which reported no previous history of wheezing. For the wheezing group, special emphasis was given to the number of wheezing attacks in the past year, number of emergency room (ER) visits, need for hospital admission or any paediatric intensive care (PICU) admission for wheezing, if any. Triggers of wheezing episodes and use of rescue and control medications were also recorded. Cases in the wheezing group were further subdivided into episodic wheezers (EW) and multiple trigger wheezers (MTW) according to Brand et al. (17). According to this classification, children were diagnosed as EW if they have intermittent wheezing episodes that are mostly associated with evidence of viral illness and cold and are well in between those attacks. However, wheezers are labeled as MTW if they have wheezes between the discrete episodes.

The timing of serum vitamin D assessment was recorded and seasonal variations in vitamin D levels were accounted for in the regression analysis. Other confounding variables that were collected included: parental smoking, consanguinity, family history of atopy, other atopies in the enrolled cases, daycare attendance, number of persons living in the same house, and number of children sleeping in the same bedroom. To ensure homogeneity among the studied cases, only Kuwaiti children were enrolled to avoid major cultural and social differences that might affect vitamin D levels or the diagnosis of wheezing. Since all cases presented with serum level for 25-hydroxy vitamin D, ethical research committee approval was waived.

Exclusion criteria included patients with chronic lung and congenital heart diseases as well as cases who received vitamin D supplementation in the 3 months prior to enrollment or had an acute illness at time of vitamin D assay. We also excluded cases without doctor diagnosed wheezing and with only one wheezing episode in the last year as reported by parents. Wheezers in the episodic group were excluded if they received control medications between attacks. Patients with body mass index (BMI) below 3rd percentile and those \geq 85th percentile were excluded to avoid effect of disturbed nutritional status on vitamin D level and occurrence of wheezing. Additionally,

ex-preterm cases and those with poor data recall were also excluded. Lastly patents/caregivers refusing to participate in the study were not included.

Finally, serum 25(OH)D was measured in a peripheral venous blood sample from each child by electrochemiluminescence assay (ECLA) using Cobas e602 autoanalyzer from Roche diagnostic Company in the Al-Adan Hospital laboratory with a measuring range of 3.00 – 70.00 ng/mL (7.50 – 175 nmol/L). The serum samples were separated after 10 minutes of centrifugation. Samples were processed immediately for cases and controls under similar laboratory conditions. Laboratory staff were blinded to the case-control status of the samples. Interpretation of 25(OH)D levels was done according to the US Endocrine Society guideline (18), which defines vitamin D deficiency as 25(OH)D less than 20 ng/ml (50 nmol/l), vitamin D insufficiency as 25(OH)D between 21 and 29 ng/ml.

The sample size was calculated setting the confidence level at 95%, the margin of error at 0.05, and the power (1- β) at 0.85. According to the previous reports, vitamin D deficiency is reported in around 40–50% of the population (9). For the wheezing group we assumed the deficiency could reach 65%, and sample size was calculated to be 187 (at least 93 patients in each group).

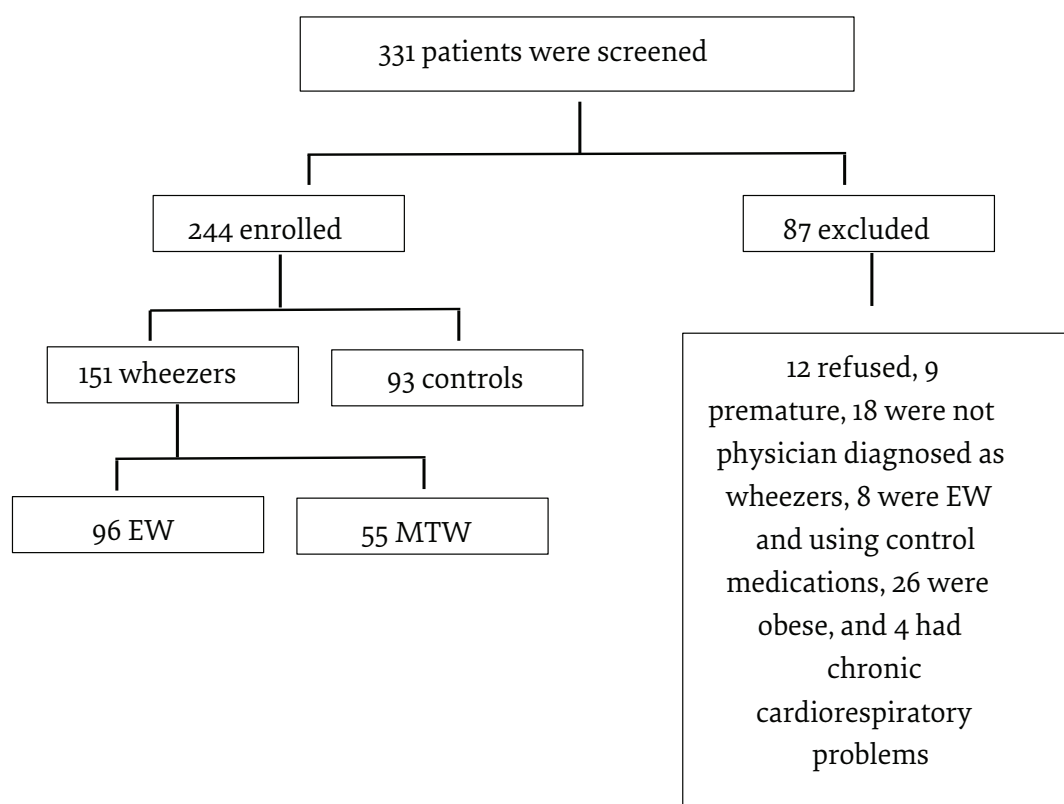
IBM SPSS Statistical package for social science, version 20, was used for data analysis. Descriptive statistics were generated for demographic factors; chi-square test was used to compare categorical data. Continuous data were compared using Mann-Whitney U test and Kruskal-Wallis test. For assessment of possible role between vitamin D status and wheeze we used the multivariate regression analysis. Data are presented as median (inter quartile ranges [IQR]) for continuous data and number and percentage for categorical data. $P < 0.05$ is considered significant.

Results

Three hundred and thirty-one cases were initially screened; however, only 244 children were included in the study. The age range of the enrolled children was 24 to 69 months, and their median was 32 and IQR 28–40 months, and 134 (54.9%) were females. One hundred and fifty-one children were included in the wheezing group and they were further divided into 96 EW and 55 MTW (Figure 1).

Table 1 shows the demographic characters of the enrolled children and their vitamin D status. Significantly, more wheezers gave positive history of other atopies and parental smoking with higher person to bedroom ratio. Children in the wheezing group had significantly lower serum 25(OH)D level when compared to the control group ($P < 0.001$).

Table 2 compares the EW to the MTW regarding socio-demographic data, 25(OH)D levels, ER visits, and the need for hospital admission. More MTW gave positive history of parental smoking ($P = 0.042$), person to bedroom ratio ($P = 0.046$), and ER visits in the past

Figure 1 Flowchart showing the screening and enrollment of cases.**Table 1** Comparison between the wheezers and control groups regarding age, sex, socio-demographic data and serum 25(OH)D level.

	Wheezing group (151)	Control group (93)	P
Age (months)	32 (27-40)	32 (28.5-41)	0.318*
Sex (male)	90 (59.6%)	44 (47.3%)	0.065**
Consanguinity	100 (66.2%)	57 (61.3%)	0.492**
Family history of atopy	75 (49.7%)	40 (43%)	0.356**
Other atopies in the case	64 (42.4%)	26 (28%)	0.029**
Daycare	111 (73.5%)	61 (65.6%)	0.196**
Parental smoking	63 (41.7%)	25 (26.9%)	0.020**
Number of persons in the same house			
Up to 5	52 (34.4%)	44 (47.3%)	0.112**
5-10	83 (55%)	43 (46.2%)	
More than 10	16 (10.6%)	6 (6.5%)	
Person to bedroom ratio			
1	58 (38.4%)	51 (54.8%)	0.024**
2	83 (55%)	40 (43%)	
3 or more	10 (6.6%)	2 (2.2%)	
Serum 25(OH)D level (ng/ml)	24.06 (15.8-35.62)	28.9 (21.6-55.84)	<0.001*
Serum 25(OH)D Category			
Normal (> 30 ng/ml)	48 (31.8%)	42 (45.2%)	0.040**
Insufficient (21-29 ng/ml)	58 (38.4%)	35 (37.6%)	
Deficient (<20 ng/ml)	45 (29.8%)	16 (17.2%)	

Data are presented as median (IQR) for continuous data and number and percentage for categorical data.

*Mann-Whitney U Test,

**Chi-Square test.

Table 2 Comparison between episodic and multiple trigger wheezers regarding age, sex, sociodemographic data, serum 25(OH)D, ER visits, and hospitalization records

	Type of wheezers in the wheezing group		P
	EW (96)	MTW (55)	
Age	32 (26-38.75)	33 (29-41)	0.123*
Sex (male)	61 (63.5%)	29 (52.7%)	0.229**
Consanguinity	65 (67.7%)	35 (63.6%)	0.721**
Family history of atopy	42 (43.8%)	33 (60%)	0.064**
Other atopies in the case	36 (37.5%)	28 (50.9%)	0.125**
Daycare	69 (71.9%)	42 (76.4%)	0.572**
Parental smoking	34 (35.4%)	29 (52.7%)	0.042**
Number of persons in the same house			
Up to 5	34 (35.4%)	18 (32.7%)	0.945**
5-10	52 (54.2%)	31 (65.4%)	
More than 10	10 (10.4%)	6 (10.9%)	
Person to bedroom ratio			
1	41 (42.7%)	17 (30.9%)	0.046**
2	52 (54.2%)	31 (56.4%)	
3 or more	3 (3.1%)	7 (12.7%)	
Serum 25(OH)D level (ng/ml)	25.67 (18.9-39.1)	22.35 (15.42-28.15)	0.052*
Serum 25(OH)D Category			
Normal (> 30 ng/ml)	33 (38.5%)	11 (20%)	0.062**
Insufficient (21-29 ng/ml)	33 (34.4%)	25 (45.5%)	
Deficient (<20 ng/ml)	26 (27.1%)	19 (34.5%)	
ER visits in the past 6 months	50 (52.1%)	36 (65.5%)	0.126**
ER visits in the past year	60 (62.5%)	45 (81.8%)	0.017**
Hospital admission in the past year	9 (9.4%)	11 (20%)	0.081**

Data are presented as median (IQR) for continuous data and number and percentage for categorical data.

*Mann-Whitney U Test,

**Chi-Square test.

year ($P = 0.017$) compared to EW. Lower 25(OH)D levels were observed among MTW with more of them in the deficiency category, yet these results did not reach statistical significance as compared to episodic wheezers ($P = 0.052$).

Table 3 shows serum 25(OH)D level according to the season of vitamin D status assessment in the whole cohort and according to the presence or absence of wheezing. Table 4 shows that a decrease in the serum 25(OH)D level was associated with higher risk of wheezing in our series even after adjustment for other variants (model 2, OR

0.965, $P < 0.001$). Interestingly, low serum 25(OH)D level was an independent risk factor for being a MTW in the cohort of cases (model 2, OR 0.961, $P = 0.007$) as shown in Table 5.

When we categorized our cases according to 25(OH)D level, Table 6 shows the cases with deficient 25(OH)D had a higher risk of wheezing when compared to the normal group [OR 2.82, $P = 0.013$] after adjustment for other variants. The insufficient group had an odds ratio of 1.45 but with no statistical significance ($P = 0.278$).

Table 3 Serum 25(OH)D level according to season

	All cases		Study groups		**
	n	Serum 25(OH)D *	Wheezing group (151)	Control group (93)	
Summer	56	25.04 (20.01-36.87)	22.26 (15.67-26.38)	31.91 (21.00-46.89)	P 0.005
Fall	66	25.48 (20.78-41.24)	25.48 (20.27-39.37)	26.65 (21.16-59.79)	P 0.293
Winter	69	22.36 (12.25-28.57)	20.76 (9.42-26.33)	26.70 (19.32-29.02)	P 0.004
Spring	53	43.06 (26.73-59.71)	44.59 (27.74-56.37)	43.06 (24.97-59.91)	P 0.986

Data are presented as median (IQR).

* $P < 0.001$ by the Kruskal Wallis test.

**Statistical significance test was done by the Mann-Whitney U-test.

Table 4 Association between serum 25(OH)D levels (ng/ml) and the risk of wheezing among the studied cases

	B	OR (95% CI)	P
Multivariable model 1*			
Serum 25(OH) D levels	-0.029	0.971 (.957-0.986)	< 0.001
Multivariable model 2**			
Serum 25(OH) D levels	-0.035	0.965 (.948-0.983)	< 0.001
Male sex	0.73	2.078 (1.22-4.3)	0.016
Fall season	1.132	3.1 (1.35-7.1)	0.007
Other atopies in the case	0.83	2.29 (1.22-4.3)	0.01
Age (months)	-0.03	0.97 (0.941-1)	0.052

*Model 1: unadjusted

**Model 2: adjusted for season of serum 25(OH)D measurement, age, sex, day care attendance, parental smoking, other atopies in the cases, family history of atopy, number of persons living in the same house (less than 5, from 5-10 and more than 10), number of children sleeping in the same bedroom (one, two, 3 or more), and consanguinity.

Table 5 Association between serum 25(OH)D levels (ng/ml) and the risk of being multiple trigger wheezer within the wheezing group.

	B	OR (95% CI)	P
Multivariable model 1*			
Serum 25(OH) D levels	-0.022	0.978 (.955-1.001)	0.057
Multivariable model 2**			
Serum 25(OH) D levels	-0.04	0.961 (.933-.989)	0.007
Family history of atopies	0.864	2.37 (1.1-5.06)	0.025
Age (months)	0.05	1.05 (1-1.1)	0.033

*Model 1: unadjusted

**Model 2: adjusted for season of serum 25(OH)D measurement, age, sex, day care attendance, parental smoking, other atopies in the cases, family history of atopy, number of persons living in the same house (less than 5, from 5-10 and more than 10), number of children sleeping in the same bedroom (one, two, 3 or more), and consanguinity.

Table 6 Association between serum 25(OH)D categories and the risk of wheezing among the studied cases

	OR (95% CI)	P
Multivariable model *		
Normal (> 30 ng/ml)	1 (reference)	0.047
Insufficient (21-29 ng/ml)	1.45 (.742-2.82)	0.278
Deficient (<20 ng/ml)	2.82 (1.24-6.4)	0.013

*This model shows the association between serum 25(OH)D categories and the risk of wheezing among the studied cases. The model was adjusted for season of serum 25(OH)D measurement, age, sex, day care attendance, parental smoking, other atopies in the cases, family history of atopy, number of persons living in the same house (less than 5, from 5-10 and more than 10) and number of children sleeping in the same bedroom (one, two, 3 or more).

Discussion

The results of the current study revealed significantly more wheezers in the vitamin D deficiency category compared to more controls in the normal category. The regression studies further proved that the decrease in the serum 25(OH)D level was independently associated with higher risk of wheezing in our series.

Although Uysalol et al. (13) found no significant difference in vitamin D levels between frequent wheezers and controls (probably due to the younger age of their studied series and their small sample size), several epidemiological studies suggest that low levels of vitamin D during pregnancy and early life are inversely associated with the risk of developing respiratory infections and wheezing in childhood (19,20). Recently in

2016, Prasad et al. (21) reported that each 10ng/ml decrease in vitamin D level is associated with 7.25% greater odds of wheezing in children less than 3 years of age. In 2014 Stenberg Hammar et al. (22) demonstrated that subnormal levels of vitamin D are associated with acute wheeze in pre-school children. Additionally, the higher the maternal total vitamin D intake during pregnancy conferred lower risks for ever wheeze, wheeze in the previous year, and persistent wheeze in 5-year-old children (23).

Although the current study showed lower 25(OH)D levels among MTW with more of them in the deficiency category, yet these results did not reach statistical significance. Nonetheless the regression studies proved that the decrease in the serum 25(OH)D level was independently associated with higher risk of being a MTW. In support of those findings, Uysalol et al. (13)

reported significantly lower vitamin D in MTW. Vitamin D derangement posing as a possible risk for MTW could be attributed to its potential role in the pathogenesis of atopy (24), or involvement in lung development (25), and not only to the reported increased incidence of respiratory viral infections (26). Data from both animal models and humans support the hypothesis that low vitamin D is a risk factor for respiratory infection. Vitamin D directly and indirectly induces production of antimicrobial proteins and has other antimicrobial effects (27,28). Additionally, vitamin D may protect against inflammatory reactions and may be broadly important in regulating chronic lung inflammation (29). Lastly, evidence suggests a role for vitamin D in lung development; vitamin D deficiency in early life may lead to permanent susceptibility and poorer respiratory outcomes that are not atopy related (25).

Significantly more of our series of wheezers gave positive history of atopy and parental smoking with higher person to bedroom ratio, which agrees with Uysalol et al. (13). Similar results were demonstrated when comparing MTW to EW with more hospitalization and ER visits in the previous 6 months and year, yet only the latter reached statistical significance. It is worth noting is that both McNally et al. (30) and Wayse et al. (31) have shown a relationship between lower vitamin D levels and hospitalization.

To our knowledge this the first work that explores the impact of vitamin D deficiency on Kuwaiti wheezers, and

although we implemented a strict enrollment criteria and tried to minimize culture and social differences on vitamin D status by assessing only Kuwaiti pre-schoolers, this study has its own limitations. First, the study is cross-sectional and therefore has a number of endemic limitations. Second, not all the cases in the MTW group were on control medications and we did not account for the compliance and drug effect on the frequency and severity of wheezing. Finally, there was no testing for allergen exposure at home, which might influence the occurrence of wheezing and its pattern.

Conclusion

Derangement in 25(OH)D levels can be linked to wheezing in pre-school Kuwaiti children primarily in the MTW group, which was also more burdened with recurrent ER visits. This emphasizes the importance of consolidating the preventive measures taken to face the deranged vitamin D status, thus eliminating one of the risk factors for wheezing in pre-school age. Cohort studies are needed to clarify the possible link between vitamin D status and the pattern and degree of wheezing for elucidation of the role of vitamin D in the severity of wheezing, and whether such cases would benefit from vitamin D supplementation.

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Competing interests: None declared.

Statut de la 25-hydroxyvitamine D sérique et respiration sifflante chez les enfants d'âge préscolaire, Koweït

Résumé

Contexte : On reconnaît de plus en plus les rôles extra-squelettiques critiques joués par la vitamine D, y compris dans les maladies pulmonaires.

Objectifs : La présente étude a été réalisée pour explorer le rôle possible de la vitamine D dans l'apparition de la respiration sifflante chez des enfants koweïtiens d'âge préscolaire.

Méthodes : Sur les 244 enfants de l'hôpital Al-Adan, 151 cas ont été inscrits comme siffleurs et les autres ont servi de témoins. Les siffleurs ont été subdivisés en siffleurs épisodiques et siffleurs récurrents de causes multiples. Les antécédents détaillés des crises de respiration sifflante, les hospitalisations antérieures et les admissions aux soins intensifs ont été consignés, ainsi que leurs taux de 25-hydroxyvitamine D sériques [25(OH)D].

Résultats : Le 25(OH)D sérique était significativement plus faible dans le groupe de respiration sifflante, et sa diminution était un facteur de risque de respiration sifflante. De plus, le taux de 25(OH)D sérique n'était pas significativement différent entre les siffleurs épisodiques et les siffleurs récurrents de causes multiples ; néanmoins, son bas niveau pourrait être lié à la respiration sifflante récurrente de causes multiples.

Conclusions : La carence en vitamine D augmente le risque de respiration sifflante chez les enfants d'âge préscolaire au Koweït. Un lien possible entre un faible taux de 25(OH)D sérique et la respiration sifflante récurrente de causes multiples pourrait mettre en évidence un rôle spécifique de la vitamine D en lien avec l'atopie. La prévention et la prise en charge rapide de la carence en vitamine D devraient être envisagées chez les nourrissons et les enfants dont la respiration est sifflante.

حالة مصل ٢٥-هيدروكسي فيتامين د و صفيير الصدر لدى الأطفال ما قبل سن المدرسة، الكويت

علاء محمد عبد القادر، مي فؤاد نصار

الخلاصة

الخلفية: يتزايد الاعتراف بالدور الإضافي البالغ الأهمية لفيتامين د إلى جانب الهيكل العظمي، بما في ذلك علاج أمراض الرئة.

الأهداف: أُجريت هذه الدراسة لبحث الدور المحتمل لفيتامين د فيما يتعلق بتكرار صفيير الصدر بين الأطفال ما قبل سن المدرسة في الكويت.

طرق البحث: من بين ٢٤٤ طفلاً من مستشفى العبدان، سُجلت ١٥١ حالة على أنها مصابة بصفيير الصدر بينما اعتُبرت الحالات الأخرى مجموعات ضابطة. وجرى تقسيم المرضى إلى المصابين بصفيير الصدر العرضي والمصابين بصفيير الصدر متعدد الحدوث. وجرى تسجيل التاريخ المرضي لهجمات الصفيير بالتفصيل، وحالات الإدخال السابقة إلى المستشفى، والإدخال إلى الرعاية المركزة، بالإضافة إلى مستويات مصل ٢٥-هيدروكسي فيتامين د [OH)D)٢٥] لديهم.

النتائج: كان مستوى مصل OH)D)٢٥ منخفضاً بشكل كبير في مجموعة المصابين بصفيير الصدر، وكان انخفاضه أحد عوامل الخطر المؤدية للإصابة بصفيير الصدر. إضافة إلى ذلك، لم يكن مستوى مصل OH)D)٢٥ شديد الاختلاف بين المصابين بصفيير الصدر العرضي والمصابين بصفيير الصدر متعدد الحدوث؛ ومع ذلك، يمكن ربط مستواه المنخفض بصفيير الصدر متعدد الحدوث.

الاستنتاجات: يزيد نقص فيتامين د من خطر الإصابة بصفيير الصدر بين الأطفال ما قبل سن المدرسة في الكويت. ويمكن أن يبرز الرابط المحتمل بين انخفاض مصل OH)D)٢٥ والإصابة بصفيير الصدر متعدد الحدوث الدور المحدد لفيتامين د فيما يتعلق بالتأب. ويجب الأخذ في الاعتبار الوقاية من نقص فيتامين د والتدبير العلاجي الفوري له بين الرضع والأطفال المصابين بصفيير الصدر.

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Pain characteristics of older residents in Iranian nursing homes

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Abstract

Background: Pain is a common complaint among the aging population, particularly among the older residents of nursing homes.

Aims: The main aim of the study was to examine the pain characteristics among older residents of nursing homes in Tehran, Islamic Republic of Iran.

Methods: This was a cross-sectional study. The sample consisted of 394 older adults admitted to Tehran nursing homes. To gather the required data, Brief Pain Inventory and Abbreviated Mental Test score were used.

Results: 51% of the female and 26% of the male participants suffered from pain. Lower extremity and lower part of back were the most frequently affected. Pain interfered with general activity ($P < 0.001$), mood ($P = 0.016$), walking ($P < 0.001$), normal work ($P < 0.001$), relations with others ($P = 0.043$), sleeping ($P = 0.002$) and enjoyment of life ($P = 0.019$) of the older residents and these effects were more prominent in female sex. Factors such as age, gender and schooling were of significant relationships with pain ($P < 0.001$) and its intensity ($P < 0.001$).

Conclusions: Chronic pain is common among older residents of nursing homes and deteriorates their quality of life. This study reconfirms the previously mentioned importance of using effective pain evaluation and pain management strategies in nursing homes.

Keywords: Pain assessment, older adults, nursing home, pain management, Iran

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Introduction

Pain is a common complaint among the aging population, particularly among the older residents of nursing homes (1-3); it is mostly due to the increasing prevalence of age-related disorders, such as arthritis, osteoporosis, and peripheral vascular diseases (4), which are mostly progressive. Usually the resultant pain is persisting due to the degenerative nature of these conditions. Pain can lead to mobility decline, role change, and psychological disturbance. Pain resulting from acute or chronic conditions is associated with decreases in physical and social functions, activities of daily living (ADL) and quality of life, and it is seen as a key indicator of physical limitations (5-7). Older people often do not actively report pain, perhaps because of the stigma associated with it or because of their own forbearance/stoicism (8). Undetected and untreated pain is still common among nursing home residents, and persists despite pain management quality indicators (9).

With the gains in life expectancy during the 20th century, the number of people aged 65 and older has increased and by the middle of the 21st century, those aged 60 and above will make up 22% of the world's population (10). The increase in the aging population is accompanied by greater demand for long-term healthcare services.

Sandberg et al. reported that more than 40% of European older adults aged 65 or above will spend some time of their life in a nursing home (11). It has been estimated that 45% to 80% of nursing home residents suffer from and report persistent pain, making it one of the most commonly reported symptoms in long-term care facilities (12-14). Recent evidence in the Islamic Republic of Iran revealed that the majority of older adults reported knee and back pain (more than 50%) and this was regardless of the chronicity, time, and the mode of reactions they aroused in the participants (15).

The aging population in the Islamic Republic of Iran has increased in the last few decades; more than six million people are aged 60 and over (9.3% of total population) (16). Long-term care of elders is still mostly family-based and residents of nursing homes usually are the most medically and socially vulnerable. Recently, an ascending trend in the number, capacity and spread of nursing homes in the country has occurred, which is indicative of the necessity of paying more attention to them (17). However, the population using nursing home services in the Islamic Republic of Iran is at variance with their counterparts in Western societies. In Iranian culture, caring for older individuals is the duty of the family, and families are considered the main source of

support. Iranian nursing home residents are mostly impoverished and homeless people, stricken by multiple physical and psycho-social problems, with no family members available. Such nursing homes offer help with custodial and bathing, dressing and eating, as well as skilled care given by registered nurses including medical monitoring and treatments (18).

The high prevalence of pain and its impact on older adults' lives makes it an important public health issue (19). Assessment of pain, especially in nursing homes, is often problematic (20). However, in managing pain, it is important to provide an individually tailored care for each resident, which depends considerably on careful pain assessment (21). Tse et al. advised all nurses to improve their skills in assessing and managing pain of older people in order to decrease their suffering, frailty and psychological distress (22). Therefore, improving pain assessment and management should be considered as a high priority for healthcare providers (23,24). Thematic analysis by Harmon et al. identified that pain relief and care requires inclusion of the older person in the provision of care (25).

It is thought that little research has been done on pain among nursing home residents in the Islamic Republic of Iran. We found just one study by Asghari et al. which revealed that 72.8% of the residents of nursing homes in Tehran had some kind of pain and 66.7% reported persistent pain (i.e., the existence of pain every day or almost every day) (26). It seems that despite the high prevalence of pain among nursing home residents, this topic still has not been adequately explored in and somehow neglected by both clinicians and researchers. However, experience of pain could be modified by social and cultural factors (27), therefore it is necessary to look at the contexts if we intend to gain a deeper knowledge into pain characteristics of a specific population. Thus, the present study was implemented with the aim to examine the pain characteristics of older people residing in the nursing homes of Tehran.

Methods

Design and participants

In this cross-sectional study, 13 nursing homes (total 31) were approached through cluster sampling method and their residents were invited to participate in the study. To select nursing homes, Tehran was divided into five regions including north (three homes), south (two homes), east (two homes), west (three homes), and central (three homes), and part based on official socioeconomic status index. The first two nursing homes were selected from each region randomly, and if they could not fill up their share in the sample, another one randomly selected. The final sample consisted of 394 older adults out of 1500 residents of Tehran nursing homes in 2012. Mean age of the 394 participants was 74.3 (SD: 10.8) years, and 253 (59.6%) were female.

Approval for the study was granted by the Human Subjects Ethics Sub-committee of the University of Social

Welfare and Rehabilitation Sciences, Deputy of Research. Participants were informed about the aim and procedure of this study, and written consent was obtained from all the participants. They were informed that they could withdraw from the study at any time and that all information related to them would remain confidential. Inclusion criteria for the participants included age being 60 years or older, ability to communicate in Persian and orientation to time and place, living in nursing homes for at least a month (decreasing the impact of stressful life event of transition to nursing home), and no significant cognitive impairment (AMTs ≥ 7) (28). After selecting participants, due to the high frequency of low literacy and illiteracy among them, the study questionnaires were addressed to the participants by trained research assistants and their responses taken.

Data collection

A demographic information form was completed by the participants and included questions about age, gender and schooling. The Brief Pain Inventory (BPI) was used to gather the data; it evaluates the multidimensional nature of pain including pain sites, pain intensity and pain interference with life activities during the period of a week (29). BPI consists of three parts; first, it includes pictures representing back and front body outlines which are presented to participants to mark their area of pain on them, and sequentially numbering the different pain sites. Second, it includes four single-item measures of pain intensity: worst pain, least pain, average pain, and current pain. Each item is rated from 0 ("no pain") to 10 ("the worst pain I can imagine"). The average of these four items represents patients' overall pain intensity. Third, it includes seven items that assess the extent to which pain interferes with general activity, mood, walking, normal work, relations with others, sleeping, and enjoyment of life. Each item is rated on a 0–10 scale (30). The BPI is validated for use in older adults (31) and Mirzamani et al. showed that the BPI is a valid and reliable tool in the Iranian population (32).

Significant cognitive impairment among the study participants, interfering with informed consent, was evaluated using the Abbreviated Mental Test score (AMTs) – a brief 10-item survey. Each question answered correctly scored one point and a score of 7 or less suggested cognitive impairment at the time of testing. AMTs was introduced by Hodkinson in 1972 (33). It is a rapid tool for assessing cognitive function and especially useful in determining the risk of dementia in vulnerable older patients (34). This instrument has previously been validated in Iranian elderly (35,36).

Data analysis

Descriptive statistical analysis of the quantitative data was conducted using the SPSS Version 16.0 (Chicago, SPSS Inc.). The Mann-Whitney U, Spearman's Rho Correlations and Chi-Square (χ^2) tests were used to measure the relationships between variables. The level of statistical significance was set at $P < 0.05$.

Results

Based on the results, 244 (62%) had no formal education, 75 (19%) were at elementary, 49 (12.4%) at high school and 26 (6.6%) at academic levels. Most of the subject had AMTs = 10 (n = 137, 34.8%) and the mean of AMT score was 8.75 (SD: 1.24). Figure 1 clearly shows the areas of pain among the older adults. Lower extremities on front and lower part of trunk at back (lower back) were the most frequently reported as pain sites.

The mean overall pain intensity in elders with pain was as follows: worst pain (5.03 ± 3.46), least pain (1.1 ± 1.7), average pain (2.9 ± 2.3) and current pain (1.68 ± 2.5). Table 1 presents pain intensity in elderly nursing home residents. Mean time of pain was 57.29 months (SD: 46.76) and as Table 2 illustrates, most of the residents suffered from pain for more than 60 months (n = 137, 34.8%). The findings also highlighted the participants applied self-care strategies in managing their pain. Most of the participants took prescribed medications (n = 287, 72.8%), used ointments (n = 62, 15.7%), massage (n = 62, 15.7%), hot pack (n = 1, 0.3%) and others procedures (n = 8, 2%) to relieve their pain. 45.2% used one self-care strategy (n = 178), 22.8% (n = 90) two strategies, and 8.9% (n = 35) three strategies to manage pain; 91 participants (23.1%) reported as unspecified.

The study indicated that 51% of the female and 26% of male participants suffered from pain. Table 3 shows that pain significantly interfered with general activity, mood, walking, normal work (includes both work outside the home and housework), relations with others, sleeping, and enjoyment of life in older residents and these effects were more prominent in females. Table 4 indicates that factors such as age, gender and schooling are significantly associated with pain and its intensity.

Discussion

The present study set out to determine pain characteristics in older residents of nursing homes in the Islamic Republic of Iran. The prevalence of pain in our sample was within the range found in some previous studies (37–39). In a literature review of pain prevalence among older residents of nursing homes, 27 studies were conducted between 1990 and 2009, and Takai et al. (4) found a wide prevalence rate between 3.7% and 79.5%, depending on research data sources used to detect pain. These results are consistent with those presented by Lukas et al. (3) in Services and Health for Elderly in Long TERM care (SHELTER) study, which reported pain prevalence varied significantly among countries, ranging from 19.8% in Israel to 73.0% in Finland. Our finding provides evidence that the largest proportion of this sample suffered from severe pain, and they needed more effort on behalf of the care providers in relieving pain. Moreover, the participants reported multiple sites of pain, with some similarity to previous findings (15,40,41). Consistent with the findings by Lukas et al. (3,12), and Zwakhalen et al. (13), we also found that pain prevalence appears to be demonstrably higher among females than males.

This study showed that older residents, compared with younger ones, were more likely to report suffering pain. The result is in line with the study by Leong (42), yet another study found that residents with chronic pain were younger than those without pain (43), while other studies showed no significant associations between pain and the residents' age (44,45). These conflicting results could be due to differences in sample size or methods used in the studies. Therefore, it seems that further studies are required to explore the subject.

The results of this investigation showed that there is a

Figure 1 Distribution of pain areas in the participants (N = 394)

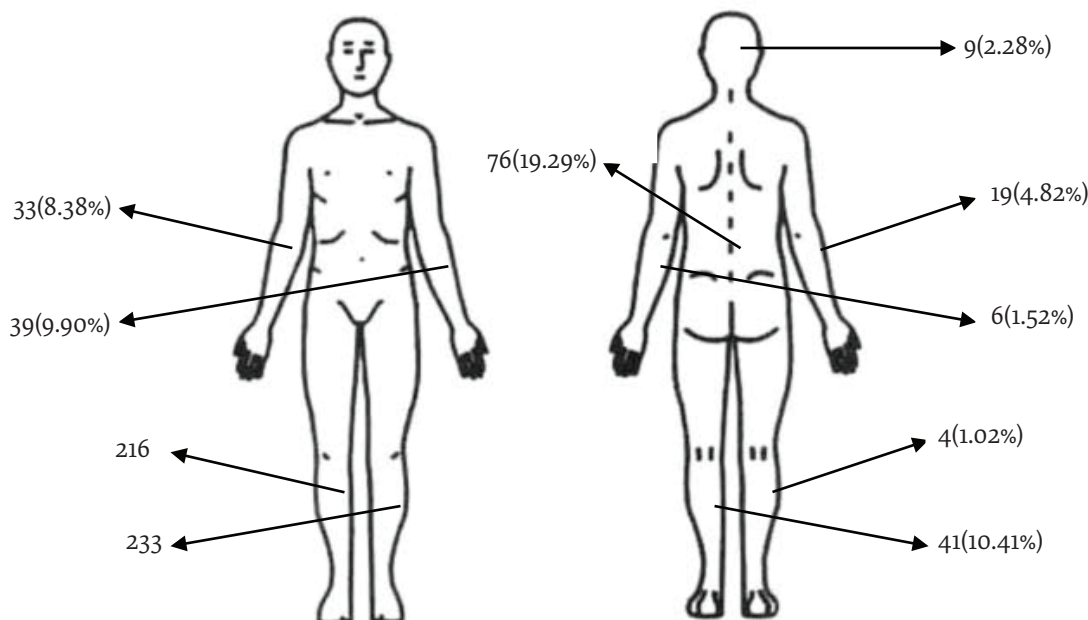


Table 1 Distribution of pain intensity among the participants (n = 394)

Pain intensity	Worst pain	Least pain	Average pain	Current pain
No pain	86 (21.8%)	223 (56.6%)	86 (21.8%)	208 (52.8%)
1	0 (0.0%)	37 (9.4%)	36 (9.1%)	38 (9.6%)
2	6 (1.5%)	75 (19.0%)	70 (17.8%)	52 (13.2%)
3	45 (11.4%)	42 (10.7%)	56 (14.2%)	30 (7.6%)
4	16 (1.4%)	5 (1.3%)	30 (7.6%)	17 (4.3%)
5	82 (20.8%)	2 (0.5%)	56 (14.2%)	15 (3.8%)
6	14 (3.6%)	1 (0.3%)	45 (11.4%)	5 (1.3%)
7	23 (5.8%)	4 (1.0%)	4 (1.0%)	6 (1.5%)
8	46 (11.7%)	0 (0.0%)	4 (1.0%)	7 (1.8%)
9	17 (4.3%)	0 (0.0%)	2 (0.5%)	5 (1.3%)
10	56 (14.2%)	4 (1.0%)	4 (1.0%)	9 (2.3%)
Pain as bad as you can imagine	3 (0.8%)	1 (0.3%)	1 (0.3%)	2 (0.5%)

Table 2 Duration of pain among the participants (n = 394)

Period (months)	n	%
≤ 12	71	18.0
13-24	40	10.1
25-36	33	8.4
37-48	25	6.3
49-60	33	8.4
> 60	107	27.2
Unspecified	85	21.6

significant relationship between pain and schooling, which is in line with SAGE, a large study investigating risk factors associated with low back pain in older adults living in lower/middle income countries (46), although some other studies in more high-income countries such as Spain (47) and the United States (48) had contrary results. Our findings showed that the lower extremity and lower part of back were the most frequently reported as pain sites. This finding is supported by Tse et al. (40), Mobily et al. (49) and Fries et al. (50). On the other hand, Kim et al. showed that knee pain and lower back pain are important factors affecting quality of life in middle-aged and elderly people (51). These results are consistent with the findings

of our study which revealed that pain interferes with mood, sleeping, daily activities, communication with others and overall enjoyment of life. The results of Tse et al. (52), Hairi et al. (53), and William et al. (54), also, suggested the same.

The most common strategy used by our participants for controlling pain was prescribed drugs and ointments. This is in line with the findings of Gong et al. that reported prescribed and over-the-counter medicines as the most often used strategies by middle-aged and older adults with arthritis (55). A nursing ethnography by Robinson showed that natural remedies, creams and ointments seemed to be perceived as being safer than prescribed medications by older participants (56). It would appear that more research is needed to determine the reasons for not using other effective strategies to relieve pain by nursing home residents.

Conclusions

Pain is common among residents of Iranian nursing homes and it can affect important life indices such as mood, sleep, communication and activity. This study showed that pain management practices in nursing homes are inadequate and need serious revision. Health policy-makers and geriatric care strategists need to improve the training of care providers in order to manage

Table 3 Pain interferences with the life of the participants

Pain interference	Female		Male		z	Mann-Whitney U	P
	M	SD	M	SD			
General activity	7.02	3.10	5.32	3.05	- 4.840	6960.5	< 0.001
Mood	3.84	3.41	2.80	2.77	- 2.409	8733.0	0.016
Walking	6.97	3.16	5.10	3.19	- 5.065	6798.0	< 0.001
Normal work	7.03	3.09	5.32	3.05	- 4.846	6956.5	< 0.001
Relations with others	3.70	3.39	2.80	2.77	- 2.028	9007.5	0.043
Sleeping	4.19	3.46	2.90	2.83	- 3.040	8278.5	0.002
Enjoyment of life	3.74	3.39	2.72	2.79	- 2.353	8777.5	0.019

Table 4 Relation of pain and its intensity with demographic variables

Having pain	Chi-Square		Pain intensity	Spearman's Rho Correlations	
	χ^2	P		r	P
Age	18.18	< 0.001	Age	0.210	< 0.001
Gender	15.78	< 0.001	Gender	- 0.183	< 0.001
Schooling	19.21	< 0.001	Schooling	- 0.133	< 0.001

older residents' pain and help improve their quality of life. Variables such as age, sex and depression can affect pain severity and must be taken into account in pain assessment and management. This study reconfirms the previously mentioned importance of using effective pain evaluation and pain management strategies in nursing homes.

Implications for practice

Nursing homes personnel needs more training on pain assessment and management in order to lower the levels of pain, frailty and psychological distress among nursing home residents, and revisit pain management strategies

to help their residents with the best possible option. Older people also can actively participate in their pain management through self-care training and learning how to use different available means for pain alleviation.

Limitations

We could not include residents with impaired mental functioning due to ethical considerations and due to the unavailability of their legal or health guardians. This study was implemented only in the metropolitan of Tehran, therefore our findings cannot be generalized to include the whole country and a similar nationwide study is recommended.

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Competing interests: None declared.

Caractéristiques des douleurs ressenties par les résidents âgés dans les maisons de retraite iraniennes

Résumé

Contexte : Les douleurs constituent une plainte fréquente chez les personnes vieillissantes, en particulier parmi les résidents âgés des maisons de retraite.

Objectifs : La présente étude a pour objectif principal d'examiner les caractéristiques des douleurs ressenties par les résidents âgés des maisons de retraite à Téhéran (République islamique d'Iran).

Méthodes : Il s'agit d'une étude transversale. L'échantillon se composait de 394 adultes âgés, résidant dans les maisons de retraite de Téhéran. Pour recueillir les données nécessaires, l'échelle du Questionnaire concis sur la douleur et le score du test mental abrégé ont été utilisés.

Résultats : 51 % des femmes et 26 % des hommes ayant participé à l'étude souffraient de douleurs. Les extrémités inférieures et la partie basse du dos étaient les régions les plus fréquemment touchées. La douleur interférait avec l'activité générale ($p = 0,001$), l'humeur ($p = 0,016$), la marche ($p < 0,001$), le travail normal ($p < 0,001$), les relations avec les autres ($p = 0,043$), le sommeil ($p = 0,002$) et la joie de vivre ($p = 0,019$) des résidents âgés et ces effets étaient plus marqués chez les femmes. Des facteurs tels que l'âge, le sexe et le niveau d'instruction étaient en corrélation étroite avec la douleur ($p < 0,001$) et son degré d'intensité ($p < 0,001$).

Conclusions : Les douleurs chroniques sont fréquentes chez les résidents âgés des maisons de retraite et dégradent leur qualité de vie. La présente étude confirme à nouveau l'importance mentionnée précédemment d'utiliser des stratégies efficaces d'évaluation et de prise en charge de la douleur dans les maisons de retraite.

خصائص الألم لدى النزلاء كبار السن في دور رعاية المسنين الإيرانية

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الخلاصة

الخلفية: يعد الألم شكوى عامة بين السكان المسنين، لا سيما بين كبار السن الذين يقطنون دور رعاية المسنين.

الأهداف: هدفت هذه الدراسة إلى فحص خصائص الألم بين كبار السن في دور رعاية المسنين في مدينة طهران، إيران.

طرق البحث: تُعدُّ هذه الدراسة دراسة مقطعية. وشملت العينة ٣٩٤ مسنًا تم إدخالهم إلى دور رعاية المسنين في مدينة طهران. وجمع البيانات المطلوبة، استُخدم اختبار الحصر الموجز للألم والاختبار النفسي المختصر.

النتائج: كان ٥١٪ من الإناث و ٢٦٪ من الذكور المشاركين يعانون من الألم. وأكثر المواضيع التي يتكرر تأثرها بالألم هي الطرف السفلي والجزء السفلي من الظهر. وتداخل شعور المسنين المقيمين بالألم مع النشاط العام ($p < 0.001$)، والحالة المزاجية ($p = 0.016$)، والمشية ($p < 0.001$)، والعمل المعتاد ($p < 0.001$)، والعلاقات مع الآخرين ($p = 0.043$)، والنوم ($p = 0.002$)، والاستمتاع بالحياة ($p = 0.019$)، وكانت هذه الآثار أكثر وضوحًا عند النساء. وتُعدُّ عوامل مثل العمر، والنوع، والمستوى التعليمي ذات صلة مهمة بالألم ($p < 0.001$) وشدته ($p < 0.001$).

الاستنتاجات: الألم المزمن شائع بين كبار السن المقيمين في دور رعاية المسنين ويسبب تدني نوعية الحياة. وتؤكد هذه الدراسة الأهمية المذكورة مسبقًا لاستخدام تقييم الألم الفعال واستراتيجيات التدبير العلاجي للألم في دور رعاية المسنين.

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Field lessons in surveying healthcare waste management activities in Pakistan

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Abstract

Background: Developing countries face difficulties in implementing safe healthcare waste management (HWM) practices. It is important to holistically probe the ground situation to meet this challenge.

Aims: This study aimed to examine HWM practices in public and private healthcare institutions in Pakistan.

Methods: In this study we surveyed 12 public and private hospitals in a major city of Pakistan, Gujranwala. The survey consisted of waste characterization as well as targeted interviews using standardized questionnaires.

Results: The results indicated issues including lack of waste segregation, lack of sufficient knowledge and awareness regarding HWM and a high prevalence of Hepatitis C among hospital housekeeping staff. We also discovered that organizational and administrative solutions for effective HWM are as important as preventive monitoring and control.

Conclusions: Apart from technical improvement, behavioural changes are vital for a positive change regarding HWM. Overall, this study led to an increased awareness of public health issues related to HWM that had hitherto gone unnoticed by hospital staff as well as relevant public authorities in the city.

Keywords: hospital waste, waste management, developing country, sanitation, behaviour.

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Introduction

Healthcare waste management (HWM) is a serious challenge in many low- and middle-income countries, where infectious medical waste from hospitals is usually discarded in vacant plots or open dumping grounds, which are visited by substance users, stray animals and scavengers resulting in additional public health concerns (1). Pakistan is a resource-constrained country in South Asia and many of its cities have experienced rapid urbanization over the last few decades, while the public health infrastructure has not seen a proportionate growth (2). Consequently, hospitals in many of the cities in the country lack proper medical waste disposal systems such as incinerators or sanitary landfills. Thus, it is important to explore the current HWM practices, report shortcomings and take remedial action. Currently, there is a shortage of scientific literature regarding compliance with HWM regulations in public or private healthcare institutions and the few existing studies point towards serious deficiencies in HWM across the surveyed establishments (3,4). To fill this gap, we conducted a survey at the public and private hospitals in Gujranwala, which is the fifth largest city of Pakistan with an estimated population of more than 2 million and an annual growth rate of 3.49% (5). Its reputation as one of the most polluted cities in Asia (6) and the fact that it is the fastest growing city in the country (3) makes it necessary to assess the status of HWM at its hospitals.

Methods

This was a 6-part study consisting of a holistic evaluation of HWM practices at the studied hospitals covering environmental, epidemiological and organizational aspects of HWM at the surveyed hospitals as shown in Figure 1. There was only one public hospital in the city (449 beds). In addition, there were 35 private hospitals consisting of 5 philanthropic hospitals (75–250 beds) and 30 small for-profit hospitals (7–55 beds) in the predominantly urban counties of the city. The survey was conducted between September 2014 and March 2015.

Identification of key challenges for effective hospital waste management

In the first step the methodology for data collection consisted of physical segregation and weighing of hospital wastes for 7 days, along with the determination of waste management practices using a standard questionnaire. The questionnaire was developed in accordance with national regulations on HWM and addressed to hospital managers. We discovered that waste segregation, collection, storage, transportation and disposal practices at all hospitals had serious shortcomings. Prominent issues included lack of proper source segregation of waste into medical and general waste fractions, lack of a dedicated route for transferring infectious waste items, lack of colour coded bags to distinguish between risk and non-risk waste items, storage of sharp items in thin paper boxes

that could be easily pricked, and lack of safety equipment for the waste handling staff at all hospitals (3).

For a root cause analysis of these shortcomings we probed the organizational structure of HWM at two representative public and private hospitals using Social Network Analysis (7). This analysis clearly identified shortcomings such as communication gaps between different actors in the waste management network at the surveyed hospitals which were contributing to poor HWM practices. For instance, hospital management teams were weakly linked with a commercial firm to which pathological waste disposal was outsourced. This firm collected medical wastes from different hospitals in the city and carried them to an incinerator located 119 km away in another city, which resulted in environmental emissions and financial costs for the hospital.

An additional advantage of the social network analysis included identification of key players in the waste management network at the surveyed hospitals on the basis of the strength of their ties to other members as per their daily communication among each other. These key players could be used for effectively disseminating necessary information, directions and knowledge regarding HWM which was quite important considering the fact that only 37.5% of the sanitary workers at the private hospitals and merely 31.8% of the sanitary workers at the public hospital reported receiving regular trainings on HWM (8).

The information needs assessment of the hospital staff regarding safe HWM practices was determined using a multiple choice questionnaire directed towards nurses and hospital housekeeping staff as they were at the forefront for waste segregation and collection. The results showed that the percentage of correct answers for nurses and housekeeping staff at the private hospitals was 52.5% and 30.2% respectively whereas at the public hospital it was 69.2% and 47.9% respectively (8). These results stressed the need for training and education for hospital staff to ensure better HWM practices. This was especially important in terms of safety and hygiene of the hospital housekeeping staff a majority of whom did not have proper safety equipment which exposed them to the danger of acquiring infectious diseases (3). To determine the impact of the lack of safety equipment, we screened 132 out of a total population of 206 housekeeping staff at all hospitals included in the survey for HCV and HBV. HCV is a major cause of concern accounting for a prevalence of 6.5% among the general population in the city (9). Rapid testing kits were purchased and provided to the relevant lab staff at each hospital for the tests. In many cases the hospitals double-checked the results using their own kits, equipment or methods such as ELISA. No change in results was observed in any case as a result of this cross verification. In the end, 18 (13.63%) of the subjects returned positive results for HCV and accidental needle pricking was discovered as a significant risk factor after regression analysis (10). None of the cases tested positive for HBV. The results are in line with the trend in the country having the second highest cases of HCV in the

world (4.8%) while those of HBV are significantly fewer (2.5%) (9). Thus, poor waste management practices were taking a toll on the health of the hospital staff which called for the need of an immediate remedial action.

Identification of solutions for effective hospital waste management

Since Pakistan is a resource-constrained country it does not have the financial or technical solutions that can be employed on a sustainable basis for the implementation of sound HWM practices. In view of this we used Exploratory and Confirmatory Factor Analyses to discover motivational or behavioural factors that might lead to an improvement in HWM practices. We discovered that non-economic motivating factors can also influence sound hospital waste management (11). Incentives to adopt sound HWM practices include concerns about the reputation of a facility and an apprehension of liability accruing from poor HWM practice whereas concerns about financial costs and perceived over-burden on staff act as disincentives for the implementation of sound HWM. These factors can be used to devise a strategy that can be enforced with the help of the key players identified in the organizational analysis in the second part shown in Figure 1.

To reduce the environmental cost of hospital waste disposal we evaluated three different waste disposal scenarios and discovered that an integrated waste disposal system consisting of incineration, composting and material recycling as the best option (12). However, the effectiveness of such a system was dependent primarily on proper waste segregation into risk and non-risk waste types which in turn was dependent on proper training of the hospital housekeeping and nursing staffs as discussed earlier. Thus, all of the issues and solutions discovered during our survey were interconnected and needed to be resolved simultaneously.

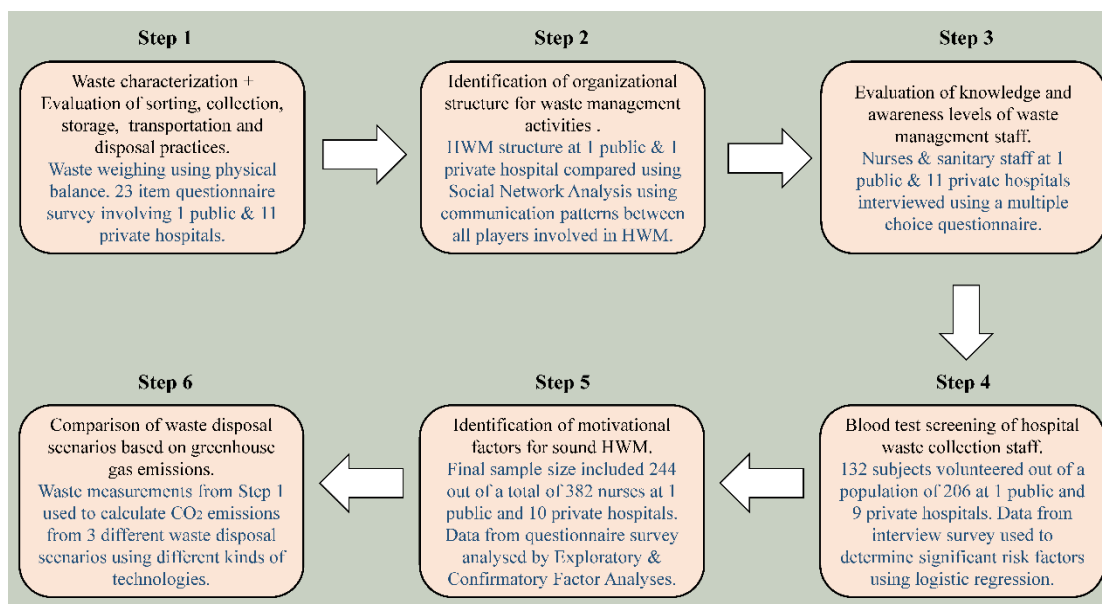
The issues and solutions probed during the survey were duly conveyed to the hospital managers for remedial action. The concerned hospital managers promised to take action against negligent staff, improve segregation procedures and improve the safety provisions for their housekeeping staff. Subsequent monitoring at the private hospitals was constrained as hospital managers were reluctant to allow re-evaluation of HWM practices. Thus we monitored the public hospital and sadly we re-witnessed hospital housekeeping staff throwing pathological waste along with general waste, most of them still without proper safety equipment.

Discussion

This survey taught us several practical lessons many of which were as important as the challenges and solutions described above.

1. We discovered that some of the hospital staff were involved in illegal sale of medical as well as general waste items and they did not want us to monitor their activities. Due to fear of liability among the con-

Figure 1 Description of the survey process.



cerned hospital staff it was quite challenging to probe and monitor HWM.

2. Informal political groupings existed among staff at larger hospitals and they often competed for influence. Conducting a survey depended on gaining and maintaining the confidence of the prominent groups within the hospital administration.
3. The patients, visitors and the general public in the vicinity of the hospital were either oblivious or indifferent towards the issue of hospital waste disposal. The general waste container of most hospitals was located on busy road cross-sections with many food stalls and canteens located nearby. However, no-one seemed to pay heed to blood stained waste lying around the container or the presence of stray animals. This points towards a general apathy of the public towards safety

and hygiene; thus, indicating the need for disseminating public health awareness and education among the public at large.

4. There were many scavengers involved in waste sorting and collection at the hospitals and in some cases they were operating under the explicit knowledge or in concert with some staff members at the hospitals. Most of these scavengers were children belonging to the Afghan refugee community and they were operating without any safety equipment. This represented legal as well as public health concerns that require stronger monitoring by the relevant government departments.
5. Some of the hospital managers cancelled HCV testing as soon as positive results started appearing. Overall, most of the administrative staff at the hospitals

Table 1 Summary of results of all the steps given in Figure 1.

Step	1	2	3	4	5	6
Quantitative results	Weighted average waste generation rate of 0.667 Kg/bed per day.	Average communication path lengths of 3.07 and 1.02 at the large and small hospitals respectively.	Ratio of trained sanitary workers at public and private hospitals was 31.5% and 37.8% respectively.	13.6% of the subjects tested positive for HCV. Needle pricking identified as a significant factor.	Hypotheses validated through EFA-CFA cross verification.	Integrated waste management system resulted in minimum net emissions i.e. 35.98 Kg CO ₂ equivalent per tonne of waste.
Qualitative results	Poor waste storage, segregation and storage practices observed.	Feedback gaps between waste collectors and hospital management were observed.	Hospital waste management efficiency and performance grew in tandem with staff trainings.	Variations existed across hospitals in different towns of the city pointing towards differences in HWM plan adoption and execution.	Concerns about hospital reputation, fear of liability and expenses act as motivational factors for sound HWM.	Waste minimization and source segregation are essential to realize an integrated and efficient hospital waste disposal plan.

seemed careless about the issue of safety equipment for hospital housekeeping staff, and since a majority of the latter belonged to the marginalized Christian community this represented another human rights issue (13).

Conclusions

The situation of HWM needs to be significantly improved at the studied hospitals. In view of the resource constrained environment of the city we propose a focus on waste minimization and effective segregation as well as installation of effective waste disposal technology and information systems as implemented in developed coun-

tries (1). The most practical solution is to involve the local community leaders in effecting a positive change. Such opinion leaders include political office bearers as well as the religious and tribal leaders in the city who may stress religious and cultural themes of cleanliness (14) to instigate a behavioural change towards HWM in a conservative society such as Pakistan. Finally, there is an urgent need to change the way healthcare establishments look at their own staff rights and responsibilities for an improvement in their standard of living.

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Competing interests: None declared.

Enseignements tirés de l'étude sur le terrain de la gestion des déchets des activités de soins au Pakistan

Résumé

Contexte : Les pays en développement rencontrent des difficultés dans la mise en œuvre de pratiques sûres en matière de gestion des déchets des activités de soins. Il est important d'étudier la situation sur le terrain de façon approfondie et dans sa globalité si l'on veut résoudre ce problème.

Objectifs : La présente étude avait pour objectif d'examiner lesdites pratiques dans des établissements de soins de santé publics et privés au Pakistan.

Méthodes : Nous avons enquêté dans 12 hôpitaux publics et privés à Gujranwala, l'une des grandes villes pakistanaïses. L'enquête comprenait la caractérisation des déchets, ainsi que des entretiens ciblés reposant sur des questionnaires standardisés.

Résultats : Les résultats ont mis en lumière des problèmes tels que l'absence de tri des déchets, le manque de connaissance et de sensibilisation suffisantes en matière de gestion des déchets des activités de soins ainsi qu'une prévalence élevée de l'hépatite C parmi le personnel d'entretien dans les hôpitaux. Nous nous sommes aussi rendu compte que les solutions organisationnelles et administratives pour une gestion efficace dans ce domaine sont tout aussi importantes que le suivi et le contrôle préventifs.

Conclusions : Outre les améliorations d'ordre technique, les changements de comportements sont essentiels afin d'adopter une approche positive à l'égard de la gestion des déchets des activités de soins. Dans l'ensemble, l'étude a entraîné une sensibilisation accrue aux questions de santé publique associées qui n'avaient jusqu'à présent pas été prises en considération par les personnels hospitaliers et les autorités publiques concernées de la ville.

الدروس الميدانية المستفادة من استطلاع أنشطة إدارة نفايات الرعاية الصحية في باكستان

مصطفى علي

الخلاصة

الخلفية: تواجه الدول النامية صعوبات في تنفيذ الممارسات الآمنة لإدارة نفايات الرعاية الصحية. ومن المهم بحث الوضع على أرض الواقع بشكل شامل من أجل مواجهة هذا التحدي.

الأهداف: هدفت هذه الدراسة إلى فحص ممارسات إدارة نفايات الرعاية الصحية في مؤسسات الرعاية الصحية في القطاعين الحكومي والخاص في باكستان.

طرق البحث: قمنا في هذه الدراسة باستطلاع شمل ١٢ مستشفى حكومي وخاص في إحدى المدن الرئيسية في باكستان، وهي مدينة جوجرانوالا. ويتألف هذا الاستطلاع من تحديد خصائص النفايات ومقابلات مع الفئات المستهدفة باستخدام استبيانات موحدة.

النتائج: أشارت النتائج إلى مشكلات تضمنت عدم فصل النفايات، ونقص المعرفة والوعي الكافيين فيما يتعلق بإدارة نفايات الرعاية الصحية، ومعدل انتشار مرتفع لالتهاب الكبد C بين عمالي النظافة في المستشفيات. كما وجدنا أيضًا أن الحلول التنظيمية والإدارية لإدارة نفايات الرعاية الصحية الفعالة في نفس أهمية الرصد والمكافحة الوقائية.

الاستنتاجات: بعيدًا عن التحسينات التقنية، تُعدُّ التغييرات السلوكية مهمة من أجل إدخال تغيير إيجابي فيما يتعلق بإدارة نفايات الرعاية الصحية.

وبشكل عام، أدت هذه الدراسة إلى زيادة الوعي بشأن مشكلات الصحة العامة ذات الصلة بإدارة نفايات الرعاية الصحية، والتي لم يلاحظها حتى الآن العاملون في المستشفيات أو السلطات الحكومية ذات الصلة بالموضوع في المدينة.

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Letter in response to article:**Incidence pattern and spatial analysis of breast cancer in Iranian women: geographical information system applications**

Ahmadi A; Ramazani R; Rezaghohi T; Yavari P. Incidence pattern and spatial analysis of breast cancer in Iranian women: Geographical Information System applications. *East Mediterr Health J.* 2018;24(4):360–367. <https://doi.org/10.26719/2018.24.4.360>

Methodological note on spatial classification

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Sir,

We read with interest the recent paper by Ali Ahmadi et al. (1). We appreciate the authors of this valuable work for their contribution to knowledge in the field of breast cancer. They first calculated crude incidence rates for each province then used the World Health Organization (WHO) standard population to estimate Standardized Incidence Rates (ASR). Finally, they tried to perform a spatial analysis to determine the incidence pattern of breast cancer in the Islamic Republic of Iran. The mean (\pm standard deviation or SD) age of patients was 50.9 (12.6) years. There was a clustering pattern in ASR of Mazandaran, Tehran, Alborz, Isfahan and Markazi Provinces and a significant cluster of high incidence rates of breast cancer in Iranian women.

After reading this paper we think it worthwhile to note some important methodological issues to prevent misinterpretation and misleading messages. But before anything, it should be noted that this study is not the first that attempts to examine the clustering of breast cancer incidences in the Islamic Republic of Iran, as mentioned by the authors in the discussion (2,3). First, the authors may have been mistaken in their use of clustering techniques, reporting the results of the global Moran I index (a spatial autocorrelation index that assigns an amount between -1 to $+1$ to all studied units [provinces],

merely to rule out the spatial randomness and not mapping the studied units, as mentioned in this study Moran's index = 0.579, $P < 0.001$, Figure 2) as local Moran (used to deal with multiple spatial relationship between units and mapping the studies units in four classes) (2). Second, surely the authors have been mistaken in their reporting of the Getis–Ord test results as local indicators of spatial autocorrelation (LISA) index; as mentioned, the local Moran classify the studied units in four classes and do not map units in the form of \pm SD. Third, the following sentence by the authors is ambiguous, “we selected Conceptualization of Spatial Relationships (CSR) from the spatial statistic tools”, because CSR is an option for calculating clustering patterns and reflect the inherent relationship between units of study, and its exact determination is very important. Finally, the authors have probably been mistaken in accurately determining the distance band (a positive number representing a cutoff point that the blocks or provinces outside of which are not considered in calculating spatial clusters), because they report two different results for Getis–Ord index (Figures 2 and 3). It should be noted that the exact determination of the distance band can change the results of the study. In conclusion, readers are strongly suggested to consider the aforementioned comments and necessity for reanalysis to avoid misclassification and misinterpretation.

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Consultation on establishing robust integrated national reporting systems for viral hepatitis

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Introduction

Viral hepatitis is a considerable public health threat in the World Health Organization (WHO) Eastern Mediterranean Region, with hepatitis B and C causing more deaths than HIV, malaria or tuberculosis combined (1). The Region is one of the most affected in the world, with estimated of more than 15 million people chronically infected with hepatitis C and 21 million with hepatitis B (2). In addition, there is insufficient information on the magnitude of viral hepatitis in most countries of the Region due to lack of data and weak surveillance systems.

The global health sector strategy on viral hepatitis 2016–2021 has the goal of eliminating viral hepatitis as a public health problem by 2030 (3). To guide its implementation in the Region, a regional action plan for the implementation of the strategy has been developed and endorsed by Member States. Both strategy and regional action plan contain strategic directions in the area of information to understand the viral hepatitis epidemic and response, and for use as a basis for advocacy, political commitment, national planning, resource mobilization and allocation, as well as programme implementation and improvement.

In support of the strategy, WHO has developed guidance for epidemiological surveillance and programme monitoring, detailing a set of 37 hepatitis programme monitoring indicators, and identifying the global top 10 key indicators to monitor the inputs, outputs, outcomes and impact of the hepatitis response (4). This is designed to enable evidence-based planning and management of national hepatitis programmes and the monitoring of global progress in achieving targets for hepatitis.

A new global reporting tool for viral hepatitis was launched in 2018, with countries in the Region reporting on viral hepatitis for the first time (5). Although countries were very keen to report their data, there were some difficulties and challenges in collecting data at the national level. Reliable strategic information for viral hepatitis is urgently needed to generate data for advocacy, target setting, and planning in low resource settings, as well as for monitoring progress and impact. Countries therefore need to take steps to introduce, expand and/or strengthen their surveillance systems for viral hepatitis.

To support this effort, the WHO Regional Office for the Eastern Mediterranean organized a consultation on establishing robust integrated national reporting systems for viral hepatitis that was held on 10–11 December 2018 in Casablanca, Morocco (6).

The objectives of the meeting were to:

- strengthen hepatitis strategic information in countries;
- orient national focal points and experts on newly developed WHO tools and guidance on hepatitis strategic information; and
- consult on the reporting tool for viral hepatitis and on coordination between national programmes, civil society and related programmes (for example, blood safety, vaccination programmes and cancer registries) for better reporting at the national level.

In the opening session, Dr Hoda Atta, Coordinator, HIV, TB, Malaria and Tropical Diseases, WHO Regional Office for the Eastern Mediterranean, Cairo, Egypt, welcomed participants and highlighted the burden of hepatitis B and C in the Region and lack of adequate data on viral hepatitis in most countries. She stressed the importance of hepatitis elimination for progress on achieving the Sustainable Development Goals, universal health coverage and WHO's regional vision 2023, and the need to strengthen and monitor country-level responses.

Summary of discussions

Presentations were made on global and regional hepatitis B and C epidemics and on the global health sector strategy and global monitoring and evaluation framework for hepatitis elimination. Participants highlighted the importance of standardizing national indicators to be in line with the 10 core key indicators (4), and noted the need for greater focus on strengthening mortality data for hepatitis B and C.

WHO shared the tools and guidance available to strengthen strategic information for viral hepatitis in countries, including the District Health Information Software 2 (DHIS2) module for viral hepatitis (7); tools and guidance for acute hepatitis and biomarker surveys (4); and the WHO protocol to estimate mortality from viral hepatitis (4). Participants felt that DHIS2 could be used as a platform for hepatitis surveillance where other

¹ This report is extracted from the Summary report on the Consultation on establishing robust integrated national reporting systems for viral hepatitis, Casablanca, Morocco, 10–11 December 2018 (http://applications.emro.who.int/docs/IC_meet_rep_2019_22334_en.pdf?ua=1).

platforms do not exist, or as a dashboard for viewing progress using aggregate data where other electronic systems are in place.

WHO introduced the new global reporting system for viral hepatitis and the rationale behind data generation from countries, and how the data can be used to monitor country progress towards elimination. The benefit of the reporting tool for countries to better guide care interventions was outlined.

Recommendations

To Member States

1. Conducting regular surveillance reviews for the continuous improvement of strategic information availability and quality.
2. Ensuring that national hepatitis programmes have better coordination mechanisms with other related health departments, in addition to the private sector and civil society, for better oversight and data availability.

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3. Identifying existing data sources by national hepatitis programmes and other stakeholders for use in generating additional data through estimations and modelling in order to achieve more comprehensive reporting at national and global levels.
4. Ensuring that national hepatitis programmes conduct regular data analysis and use outcomes for decision-making, future planning and advocacy.

To WHO

5. Providing focused technical support on strategic information to countries, such as through holding national strategic information workshops, to strengthen surveillance systems and improve estimates for incidence and mortality.
6. Providing technical support to countries in conducting biomarker surveys.
7. Conducting advocacy for the establishment of hepatitis units at the national level for countries lacking structures and programmes.
8. Expanding DHIS2 to other countries.

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