181 cases in follow-up. The median HbA1c in follow-up was 7.9% with an interquartile range of 6.8%–11%. Urine protein was assessed in 65 of 240 patients (27%). Out of this, 29 had proteinuria. Urine protein was reported trace, 1+, 2+, and 3+ in 13, 12, 2, and 2 patients, respectively.

Comorbidities and complications were documented in 96 of 240 patients (40%). Hypertension was the most common comorbid condition and was reported in 74 of 240 patients (31%). Similarly, hypothyroidism was documented in nine patients (4%), diabetic foot in seven patients (3%), chronic kidney disease in four patients (2%), coronary artery disease in two patients (1%), chronic respiratory disease in two patients (1%), and cerebrovascular disease in one patient.

Eighty-three of 240 patients (35%) were receiving only metformin. Glimepiride was a singular therapy in two patients (1%). One hundred and forty patients (58%) were prescribed both metformin and glimepiride. Five patients (2%) were using only insulin therapy. Similarly, five patients (2%) were provided with combination therapy of metformin and insulin and five patients (2%) were treated with lifestyle modifications. Fifty-six patients (23%) had obtained control as per the target levels with different modalities of treatment, 69 (29%) had partial control, 85 (35%) struggled to reach targets, and 30 (13%) failed to appear in follow-up visits [Figure 2]. There was no significant difference in glycemic control with respect to gender differences ($P = 0.748$).

Twenty-six of 240 patients (10%) had a prescription of antiplatelet agent, acetylsalicylic acid (aspirin) and statin, and atorvastatin, whereas 14 (6%) and 30 (13%) had received only aspirin and only atorvastatin, respectively. Angiotensin-converting enzyme (ACE) inhibitor, enalapril was prescribed in 11 of 29 patients with proteinuria (38%). Out of these, six cases had trace proteinuria, and five had 1+ proteinuria.

Discussion

The study showed that the diabetes patients’ visits constituted 2% of total outpatient visits in our district hospital. Since this was a hospital-based study, the actual prevalence of diabetes in the rural community could not be reflected given the limitation of awareness of symptoms of diabetes and access to health facility regarding the availability of mode of transportation and its costs. A study in rural population in Nepal suggested the prevalence of diabetes was around 7%.[12] Our study concluded that there was male predominance among diabetes patients (77.9% vs. 22.1%, $P < 0.05$). The finding was similar to other study performed in hospital setting in Nepal (63.8% vs. 36.2%).[13] However, another study from India in inpatient setting suggested otherwise, with female predominance (46% vs. 54%).[14] Further studies in community level would be helpful to clarify the gender differences in diabetes. The age ranged from 25 to 82 years. In the absence of advanced laboratory investigations in the district hospital setting, it was difficult to differentiate type of diabetes. Yet, the study underpinned the need to screen diabetes in young individuals even in rural setting.

Diabetes is a known risk factor for chronic kidney disease. Moreover, it becomes essential to screen each diabetes patient in primary care to screen for proteinuria and prevent the progression of chronic kidney disease to end-stage renal disease requiring hemodialysis or renal transplant. Our study showed that 45% of those evaluated had some degree of proteinuria. A study from primary care centers in the United Kingdom indicated that the prevalence of proteinuria was 8.6% of all diabetes patients, whereas another hospital-based study from Nepal showed the prevalence of 49%.[15,16] A community-based screening in Eastern Nepal revealed that 14.5% of diabetes patients had proteinuria.[12] The difference could be explained by the efficacy of primary health-care centers in developed...
countries in early screening and management of diabetes which was not possible in the developing world. In rural settings, the patients usually present late during the course of diabetes and suffer from late complications including nephropathy. Measuring HbA1c levels is recommended at least every 6 months. Most of the district hospitals lack such facility. Utilization of investigation depends on the availability and practice of health-care provider. Our study revealed underutilization of HbA1c testing in the hospital and demonstrated the need to reorient health-care providers on diabetes laboratory investigation modalities available in the hospital.

Diabetes is a chronic disorder, and hence, it is likely that patients of diabetes develop other conditions during diabetes. About 40% of diabetes patients had one or more comorbidities. The most common comorbidity reported was hypertension (31%) followed by hypothyroidism (4%), diabetic foot (3%), chronic kidney disease (2%), coronary artery disease (1%), chronic respiratory disease (1%), and cerebrovascular disease (0.5%). Diabetes and hypertension share similar risk factors and are likely to coexist. Pokharel et al. reported that 41% of their diabetes patients had hypertension. On the other hand, another study from Nepal in the outpatient department in a tertiary care center concluded that 25.3% of diabetes patients had comorbid hypertension. Maskey et al. concluded that 4% of their diabetes patients had hypothyroidism. The prevalence of diabetic foot was 8% in a study from the United Kingdom and 14% in another study from India. Neuropathy and diabetic eye diseases were never diagnosed and reported in our study. This finding indicated the need to train both physicians and health assistants in sensory examination and direct ophthalmoscopy to recognize these conditions in diabetes patients. Neuropathy screening could help in the early management of diabetic foot. The findings of diabetic eye disease, including cataract and retinopathy, might help prevent fall injuries and surgical interventions thereafter.

We analyzed our institutional performance in achieving target levels as per the ADA guidelines using the WHO’s PEN protocol which was designed for resource-limited health-care settings like ours. We discovered that 2% were treated with lifestyle modification counseling and were observed for follow-up. This reflected that our health-care providers were aware of the importance of lifestyle modifications in diabetes. About 93% of our patients were treated with metformin alone or in combination with glimepiride. This exhibited our adherence to the ADA guidelines and PEN protocol to start monotherapy with metformin whenever possible and add another agent if target levels were not achieved. The health-care providers prescribed insulin alone or in combination in 4% of the patients. While 35% had trouble achieving target levels with different modalities including insulin, it seemed necessary to increase our insulin usage and to understand the restraints in prescribing insulin. The fear factor of patients with injectable agents, the storage of insulin, the availability and disposal of needles, and the literacy factor required to administer prescribed quantity of insulin might discourage the use of insulin by both the providers and the patients. About 13% failed to follow-up which could be due to the migration of patients, social stigma with chronic medication usage, and death.

Both aspirin and statin have been recommended for primary prevention in diabetes with at least one additional risk factor for atherosclerotic cardiovascular disease. In this study, 29% were prescribed either one of these two agents or both. This finding advocated the need to motivate care providers in the evaluation of atherosclerotic risk factors and thereby enhance prescribing aspirin and statin to improve cardiovascular morbidity and to internalize the notion of prevention in primary care setting. Further, proteinuria in diabetes patients heralds diabetic nephropathy and subsequent progression to chronic kidney disease. Diabetic nephropathy accounts for 20%–40% of end-stage renal disease and creates additional economic burden. ACE inhibitors, such as enalapril, have indispensable role to retard the progression of diabetic nephropathy to end-stage renal disease especially in the presence of hypertension or albuminuria. ADA recommends the urinary albumin-to-creatinine ratio to decide for prescribing ACE inhibitors. Since this is not usually feasible in our rural setting, we decided to analyze ACE inhibitors with qualitative estimation of urine protein. This study recommended the necessity to strengthen the knowledge and practice of ACE inhibitors for high-risk diabetes patients in our team of health-care providers. In a nutshell, implementing the PEN protocol only is a beginning to address the rising burden of NCDs in primary care, and it is also equally important that continuing medical education (CME) activities focused on NCDs are carried out in certain time intervals and quality improvement projects, similar to this study are undertaken to evaluate the effectiveness of interventions so that necessary protocols be developed and implemented.

**Conclusion**

We studied diabetes care in a rural hospital functioning with mixed cohort of health-care providers consisting
both physicians and health assistants. The hospital had utilized electronic health record system with a robust cohort of community health workers and had implemented the PEN protocol. The study similar to this as a part of quality improvement project should be advocated as an essential tool for measuring institutional performance and impact and enhance health-care delivery. The study revealed our adherence to the PEN protocol and identified scopes of improvement for quality care of diabetes. The study reflected the need of regular CME programs on diabetes and provide secondary prophylaxis for cardiovascular morbidity and diabetic kidney disease.

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Nil.

Conflicts of interest
There are no conflicts of interest.

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Health professionals’ perspectives on factors needed to implement nutrition strategy: A questionnaire validation study

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ABSTRACT
Background: Noncommunicable diseases (NCDs) increasingly recognized as a serious, worldwide public health concern. According to the WHO, NCDs are currently responsible for two-thirds of global deaths annually. Nutritional food and unhealthy diet are contributing to an immense portion of NCDs. Exploring the role of nutrition in healthcare delivery with a particular focus on the United Arab Emirates (UAE) context is also aligned with the UAE Government’s Vision 2021.

Aim: To develop a reliable and valid questionnaire that helps to assess the agreement about factors needed to implement a nutrition strategy in the UAE.

Materials and Methods: One hundred and sixty-one health professionals were invited to respond to a questionnaire assessing agreement with factors needed to implement a nutrition strategy. The questionnaire consisted of 11 factors, each containing four items that made a total of 44 items assessed on a 7-point Likert scale (1 strongly disagree to 7 strongly agree). The questionnaire was evaluated using factor analysis, and Cronbach’s alpha was used to test the internal consistency of the responses of participants. Ethical approval was given by the Chair of Humanities and Health Sciences Research Ethics Panel (UAE).

Results: The questionnaire was validated by an expert panel. A factor analysis was carried out through responses of the health professional and revealed that the 11 factors are included in the questionnaire; only one item from the factor of resources and enablement was excluded: the inclusion of the item “hospital uses the lifespan approach in nutrition interventions” due to singularity and insufficient load of the variance extracted.

Conclusion: The study concluded that the questionnaire was valid and reliable on its form of 43 items divided into 11 factors to assess the agreement toward factors needed to implement a nutrition strategy in the UAE.

Keywords: Factor analysis, health, nutrition strategy, questionnaire, United Arab Emirates

Introduction
Noncommunicable diseases (NCDs) are rising to epidemic proportions, worldwide.1–3 These diseases, which include cardiovascular conditions, some cancers, chronic respiratory conditions, and type 2 diabetes, affect people of all ages, nationalities, and classes. The role of nutrition in the combat of NCDs has been established by a number of studies.4,5 Various governments and health ministries have recently increased their attention on NCDs.6,7 Countries worldwide understand the impact of diseases such as coronary heart diseases, diabetes, and...
hypertension. In addition, the link between the role of proper nutrition and the decrease of heart disease, diabetes, and hypertension has been established.

In the Eastern Mediterranean region, cardiovascular disease, type 2 diabetes, metabolic syndrome, obesity, cancer, and osteoporosis have become the main causes of morbidity and mortality. The estimated mortality rate due to cardiovascular disease and diabetes ranged from 179.8 to 765.2 per 100,000 populations, with the highest rates in developing countries. The prevalence of overweight and obesity (body mass index $\geq 25$ kg/m$^2$) has reached an alarming level in most countries of the region, ranging from 25% to 82%, with a higher prevalence among women. The estimated mortality rate for cancer ranged from 61.9 to 151 per 100,000 populations.

In the United Arab Emirates (UAE), more than three-quarters of mortality (76%) is attributable to NCDs. The total number of NCD deaths in a total population of 9,154,000 is 11,000 and the risk of premature death from target NCDs is 17%. Exploring the role of nutrition in healthcare delivery in general and with a special focus on combating NCDs in the UAE is aligned with the UAE Government’s Vision 2021. This entails health improvement focusing on the decrease of NCDs, specifically cardiovascular diseases by 25%, diabetes by 14%, cancers by 18%, and respiratory diseases by decreasing tobacco users by 15% of the current levels.

The execution of a strategy depends on the involvement of healthcare professionals in establishing a strategic nutrition plan that necessitates soliciting their agreement on stipulated factors. The primary aim of this study was to develop a valid and reliable questionnaire for healthcare professionals to assess the agreement about factors needed to implement a nutrition strategy in the UAE.

Materials and Methods

Study population
The study was carried out in private and public hospitals in the UAE, during 2014 as part of a Ph.D. thesis. The focus of the study was to assess the factors needed to implement a nutrition strategy according to the level of agreement. Hospitals invited to participate in the study are known to liaise with nutrition program across sector and had nutrition departments in operation. The questionnaires were distributed to various management hospitals in the UAE. Hospitals were informed that additional questionnaires can be provided if need be, none of the hospitals asked for additional questionnaires.

The type of questionnaire used was a self-administered questionnaire. They were given sufficient time to respond to the questionnaire without promoting. The data collection was supervised completely by the investigator of the study. The healthcare professionals included into the sample are physicians, nurses, nutritionists and laboratory technicians, and other quality assurances.

Out of the 200 questionnaires distributed, 161 were received by the research team. This is equal to an 80.5% response rate; this was due to the different types of follow-up used. Telephone appointments were made to ensure the personnel designated by the management; based on their experience in nutrition, interventions were available on the drop-off day for the questionnaires. The designated personnel were individuals deem most experience in identification and implementation of nutrition strategies.

The questionnaire
The questionnaire was constructed from the themes deduced from the systematic literature review. First, the questionnaire was validated by a team of international experts. Five experts on questionnaire design in the Middle East were asked to validate the questionnaire via e-mail, of whom four of which responded with feedback and one had no comments. The reviewers’ feedback on the questionnaire design and content was then analyzed and divided into 11 factors, as shown in Table 1: strategy development, people and competencies, resources and enablement, process and activity, patient orientation, quality, people and competencies, values and care design, measurement and impact, innovation and best practice, teamwork and culture and diversity. Each of these factors consisted of four items with a level of agreement assessed on a 7-point Likert scale from 1 as strongly disagree to 7 strongly agree [Table 1]. In addition, the questionnaire contained some demographical variables such as gender, age, qualification, occupation, type of hospital (private or public), and the location of the hospital.

Statistical analysis
Data entry and analyses were carried out using IBM SPSS Statistics version 21 (IBM Corp., Armonk, NY). Factor analysis was performed to measure the ability of the questions asked to relate to the actual construction that was intended to use. In the first step, the interitem correlation was explored. This created a matrix of correlation of all items. Eigenvalues and amount of variances explained were calculated for each factor and hence for each item.
Table 1: The strategic nutrition questionnaire with different factors and their items

| 1. Strategy development | In my hospital, clear processes are available to assess the effectiveness of nutrition health initiatives. |
|-------------------------|---------------------------------------------------------------------------------------------------|
| Hospital senior management is effectively involved in the development of nutrition strategies. | Measurement of impact is important to the success of implementing effective nutrition programs. |
| Management strategies require the involvement of senior management of the hospital to ensure lower incidence of NCDs. | 9. Innovation and best practice |
| Before implementing nutrition programs, the hospital establishes the relevant importance of key performance indicators. | The hospital uses various e-health services such as social media, telehealth, television commercials, and internet in nutrition interventions. |
| Strategy development is important to the success of implementing nutrition programs. | Technology is used in nutrition interventions in this hospital. |
| 2. Resources and enablement | Information to patients is achieved through advanced technological means. |
| The hospital uses the life span approach in nutrition interventions. | Innovation is important to the success of implementing effective nutrition programs. |
| Cross-government or cross-sector departments are involved in nutrition interventions. | 10. Teamwork |
| It is important for this hospital to finance programs for nutrition interventions. | Multidisciplinary teams in this hospital include nutrition personnel. |
| Resources are important to the success of implementing effective nutrition programs. | The hospital has different teams that provide nutrition assessment, screening, and care effectively. |
| 3. Process and activity | The nutrition personnel in multidisciplinary teams have a well-defined role. |
| Nutrition is sufficiently addressed as part of patient education in my hospital. | The inclusion of nutrition department is multidisciplinary teams is important to the success of implementing effective nutrition programs. |
| The demographic profile of the UAE is effectively used when setting up nutrition programs. | 11. Culture and diversity |
| Age-related programs are important in nutrition interventions. | The patient population of the hospital is considered before setting up menus. |
| Demographics are important to the success of implementing effective nutrition programs. | The hospital considers the differences in the patient ethnicity when setting up the services by nutrition department. |
| 4. Patient orientation | Culture and diversity in the patient population is considered in the nutrition strategy. |
| The hospital has clear processes for patient orientation. | Considering culture diversity of the patient is important to the success of implementing effective nutrition programs. |
| The hospital has clear processes in place to assess user expectations of nutrition programs. |  |
| User expectation feedback are effectively used in nutrition programs. |  |
| Patient empowerment is important to the success of implementing effective nutrition programs. |  |
| 5. Quality | At this stage, the risk of singularity and multicollinearity had to be taken into account (the item that is perfectly correlated $R > 0.9$). Therefore, subitems by factor were identified: (a) those failed to correlate with other and (b) those which demonstrated singularity. This was a prerequisite for the second step (i.e., reliability test) since the above items, if any, had been excluded. Kolmogorov–Wilk test of normality of reliability distribution of the scores was also done. |
| The hospital has quality measures in place to ensure nutrition care is delivered across all areas consistently. | Internal consistency reliability test (test–retest measure of reliability) was then performed by administrating the same questionnaire to the same group of health professionals. The internal reliability estimates were calculated using Cronbach’s alpha coefficient. It provides a conservative estimate of reliability and generally represents the lower bound to the reliability of a scale item. Cronbach’s alpha coefficient $\geq 0.70$ was taken as an acceptable criterion of reliability of the scale. |
| The hospital has effective processes to ensure evidence-based nutrition interventions. |  |
| Quality assurance measures are used to ensure patient-centered nutrition care. |  |
| Quality assurance measures are a success to implementing effective nutrition programs. |  |
| 6. People and competencies |  |
| Training programs that staff undergo include up-to-date nutrition care. |  |
| The staff’s core competencies include skills to ensure patient nutrition education. |  |
| Up-to-date training in nutrition care is provided in my hospital. |  |
| Training programs are important to the success of implementing effective nutrition programs. |  |
| 7. Values and care design |  |
| Shared decision-making processes are used in nutrition programs. |  |
| The methods of communicating the different nutrition services provided to patients are clear. |  |
| The activities in nutrition intervention are considered part of an integrated healthcare system in this hospital. |  |
| Communication method is important to the success of implementing effective nutrition programs. |  |
| 8. Measurement and impact |  |
| In my hospital, impact of nutrition programs are measured effectively. |  |
| The hospital uses sufficient tools for measuring impacts of nutrition programs on the population. |  |

Contd...

Table 1: Contd....

| 11. Culture and diversity |  |
| The patient population of the hospital is considered before setting up menus. |  |
| The hospital considers the differences in the patient ethnicity when setting up the services by nutrition department. |  |
| Culture and diversity in the patient population is considered in the nutrition strategy. |  |
| Considering culture diversity of the patient is important to the success of implementing effective nutrition programs. |  |

NCDs - Noncommunicable diseases, UAE - United Arab Emirates
Results

A total of 161 respondents replied to the questionnaire out of the 200 distributed. The item “the hospital uses the lifespan approach in nutrition interventions” was deleted.

Table 2: Display the load of variance explains per item and with each factor

| Item | Extration load |
|------|----------------|
| 1. Strategy development | 0.739 |
| 1.1. Hospital senior management is effectively involved in the development of nutrition strategies | 0.739 |
| 1.2. Management strategies require the involvement of senior management of the hospital to ensure lower incidence of NCDs | 0.831 |
| 1.3. Before implementing nutrition programs, the hospital establishes the relevant importance of key performance indicators | 0.852 |
| 1.4. Strategy development is important to the success of implementing nutrition programs | 0.859 |
| 2. Resources and enablement | 0.215 |
| 2.1. The hospital uses the lifespan approach in nutrition interventions | 0.215 |
| 2.2. Cross-government or cross-sector departments are involved in nutrition interventions | 0.734 |
| 2.3. It is important for this hospital to finance programs for nutrition interventions | 0.855 |
| 2.4. Resources are important to the success of implementing effective nutrition programs | 0.789 |
| 3. Process and activity | 0.784 |
| 3.1. Nutrition is sufficiently addressed as part of patient education in my hospital | 0.784 |
| 3.2. The demographic profile of the UAE is effectively used when setting up nutrition programs | 0.704 |
| 3.3. Age-related programs are important in nutrition interventions | 0.820 |
| 3.4. Demographics are important to the success of implementing effective nutrition programs | 0.842 |
| 4. Patient orientation | 0.910 |
| 4.1. The hospital has clear processes for patient orientation | 0.910 |
| 4.2. The hospital has clear processes in place to assess user expectations of nutrition programs | 0.918 |
| 4.3. User expectation feedback are effectively used in nutrition programs | 0.912 |
| 4.4. Patient empowerment is important to the success of implementing effective nutrition programs | 0.673 |
| 5. Quality | 0.863 |
| 5.1. The hospital has quality measures in place to ensure nutrition care is delivered across all areas consistently | 0.863 |
| 5.2. The hospital has effective processes to ensure evidence-based nutrition interventions | 0.933 |
| 5.3. Quality assurance measures are used to ensure patient-centric nutrition care | 0.935 |
| 5.4. Quality assurance measures are a success to implementing effective nutrition programs | 0.817 |

Table 2: Contd...

| Item | Extraction load |
|------|----------------|
| 6. People and competencies | 0.872 |
| 6.1. Training programs that staff undergo include up-to-date nutrition care | 0.872 |
| 6.2. The staff’s core competencies include skills to ensure patient nutrition education | 0.874 |
| 6.3. Up-to-date training in nutrition care provided in my hospital | 0.855 |
| 6.4. Training programs essential to the success of implementing effective nutrition programs | 0.675 |
| 7. Values and care design | 0.865 |
| 7.1. Shared decision-making processes are used in nutrition programs | 0.865 |
| 7.2. The methods of communicating the different nutrition services provided to patients are clear | 0.881 |
| 7.3. The activities in nutrition intervention are considered part of an integrated health care system in this hospital | 0.911 |
| 7.4. Communication method is important to the success of implementing effective nutrition programs | 0.724 |
| 8. Measurement and impact | 0.926 |
| 8.1. In my hospital, impact of nutrition programs are measured effectively | 0.926 |
| 8.2. The hospital uses sufficient tools for measuring impacts of nutrition programs on the population | 0.891 |
| 8.3. In my hospital, clear processes are available to assess the effectiveness of nutrition health initiatives | 0.935 |
| 8.4. Measurement of impact is important to the success of implementing effective nutrition programs | 0.717 |
| 9. Innovation and best practice | 0.911 |
| 9.1. The hospital uses various e-health services such as social media, telehealth, television commercials, and internet in nutrition interventions | 0.927 |
| 9.2. The technology uses in nutrition interventions in this hospital | 0.923 |
| 9.3. Information to patients achieved through advanced technological means | 0.911 |
| 9.4. Innovation is important to the success of implementing effective nutrition programs | 0.911 |
| 10. Teamwork | 0.849 |
| 10.1. Multidisciplinary teams in this hospital include nutrition personnel | 0.849 |
| 10.2. The hospital has different teams that provide nutrition assessment, screening, and care effectively | 0.812 |
| 10.3. The nutrition personnel in multidisciplinary teams have a well-defined role | 0.860 |
| 10.4. The inclusion of nutrition department is multidisciplinary teams is important to the success of implementing effective nutrition programs | 0.762 |
| 11. Culture and diversity | 0.897 |
| 11.1. The patient population of the hospital is considered before setting up menus | 0.897 |
| 11.2. The hospital considers the differences in the patient ethnicity when setting up the services by nutrition department | 0.928 |
| 11.3. Culture and diversity in the patient population is considered in the nutrition strategy | 0.918 |
| 11.4. Considering culture diversity of the patient is important to the success of implementing effective nutrition programs | 0.766 |

NCDs - Noncommunicable diseases, UAE - United Arab Emirates