

## Comparison of perceptions regarding nutrition education between medical interns trained in the discipline-based and the integrated curriculum in Gulf Medical University Ajman

Kadayam Guruswami Gomathi<sup>1\*</sup>, Nelofer Khan<sup>1</sup>, Syed Shehnaz Ilyas<sup>2</sup>

<sup>1</sup>Department of Biochemistry, <sup>2</sup>Department of Pharmacology, Gulf Medical University, Ajman, UAE

\*Presenting author

### ABSTRACT

Gulf Medical University, Ajman has changed from a discipline-based curriculum to an organ-system based integrated curriculum.

**Objective:** To compare perceptions of medical interns from the discipline based and the integrated curriculum regarding nutrition and nutrition education in the undergraduate medical curriculum.

**Materials & Methods:** Questionnaire based study with medical interns from the discipline based curriculum (Batch 2007) and the organ-system based integrated curriculum (Batch 2008). Respondents rated on a Likert-like (1-5) scale items spanning domains including attitudes to nutrition, perceptions regarding nutrition-related knowledge, competence in nutrition-related skills and nutrition education in the curriculum.

**Results:** 22 interns from the discipline-based and 33 from the integrated curriculum completed the survey. 61% were males. Both groups had positive attitudes to nutrition counseling (median score=4). Total scores in the knowledge domain were significantly higher in the integrated curriculum group. Perceptions regarding knowledge and skills in most nutrition related topics was good in both groups (Median score=4). Both groups of interns were uncertain (Median score=3) regarding the quantity and quality of nutrition education. Most interns felt a need for more nutrition education in the curriculum (Median score=4) however fewer interns from the integrated curriculum compared to the discipline-based curriculum felt the need for more nutrition education in 'basic nutrition concepts' (48% vs. 69%), 'nutrition in primary care settings' (44% vs. 75%), 'nutritional assessment' (52 vs. 81%) and 'evidence based nutrition' (30 vs. 75%). Similar numbers (55.6 and 56.3%) perceived the need for more 'clinical nutrition (nutrition in disease states)' in both groups.

**Conclusion:** Changing the curriculum did not bring about significant changes in attitudes regarding nutrition or perceptions regarding nutrition-related competences. However a significant increase was seen in perceptions regarding nutrition knowledge. Interns from both groups perceived a need for more nutrition education especially Clinical nutrition (nutrition in disease states).

**Key words:** Nutrition education, medical education, undergraduate curriculum.

## INTRODUCTION

The undergraduate medical curriculum at the Gulf Medical University, Ajman (GMU) changed from a discipline-based curriculum (DC) to an organ-system based integrated curriculum (IC) from the academic year 2008-2009. The IC was designed based on the outcomes and competencies required for medical graduates. While most of the content of the curriculum was similar, the new curriculum was more student-centered and integrated. In the DC, aspects of nutrition were learnt in Physiology, Biochemistry and Community medicine in the pre-clinical years, some more concepts were learnt and reinforced in the clinical years mainly during the Pediatrics, Medicine and Surgery postings. In the IC, a course titled "Nutrition and Metabolism" was introduced in the Phase-I of the curriculum bringing together aspects from Physiology, Biochemistry, Community medicine and Clinical skills related to nutritional assessment. Some more concepts are learnt and reinforced in the organ-system courses mainly in the Alimentary system (malabsorption, enteral nutrition), Cardiovascular system (diet and cardiovascular disease) and Blood and Immune system (Nutritional anemia). There were no differences in learning of nutrition during the clinical clerkships between the DC and IC.

Previous studies in the US<sup>1</sup>, UK<sup>2</sup> and Japan<sup>3</sup> had shown nutrition education in the medical curriculum to be inadequate and the issue is being addressed. We have also reported perceptions of inadequacy regarding nutrition education among graduates from our DC in an earlier study<sup>4</sup>. In this study, our objective was to compare attitudes to nutrition counseling, perceptions regarding nutrition knowledge, competence and practice, as well as perceptions regarding nutrition education between GMU interns from the DC and the IC.

## MATERIALS AND METHODS

**Study design and participants:** This was a quasi-experimental study. Participants were interns from the last batch of the DC (Batch 2007) and the first batch of the IC (Batch 2008).

**Development of the instrument:** The questionnaire used had items adapted from the 'Nutrition in patient care survey'<sup>5</sup> and the survey used by Walsh et al.<sup>6</sup> Some items were added, some deleted or modified after three rounds of discussion with faculty involved in teaching nutrition, basic medical sciences, clinical sciences as well as experts in medical education. The final questionnaire had items spanning five domains including 'Attitude to nutrition and nutrition counseling (10 items)', 'Perceptions regarding nutrition knowledge (11 items)', 'Perceptions regarding nutrition-related competences (15 items)', 'practice related to nutrition (5 items)', 'Perceptions regarding nutrition education in their curriculum (7 items)' and Demographic details. Responses were on five point Likert-like scales. Free responses were also sought for suggestions to improve nutrition education in the curriculum. The questionnaire was validated by two physicians and two nutritionists. Pilot testing was carried out on 3 medical graduates.

**Survey and data analysis:** 37 interns of the 2007 batch of the DC and 38 interns of the 2008 batch of the IC working in the Sheikh Khalifa Hospital Ajman, Umm Al Quwain hospital and Al Mafraq and Zayed Hospitals, Abu Dhabi were contacted for survey in June-July 2013 and June-July 2014 respectively. Participation in the survey was

voluntary, self-administered and anonymous. Purpose was explained as curriculum development and medical education research. Responses were entered into SPSS (IBM, USA) version 21 and analyzed. Values are reported as Median scores. Independent samples Mann-Whitney U test was used to test for significance. Significance level was set at 0.05.

## RESULTS

A total of 55 interns responded. 22 interns were from the DC (Interns-DC) and 33 from the IC (Interns-IC) giving response rates of 59.4% and 84.6% respectively. 61% were males.

**Attitude:** Median score in both groups was 4.0 indicating that both groups had positive attitudes to nutrition and nutrition counseling (Table 1). The total domain score for Interns-DC was 33.5 (25-38) while that for Interns-IC was 36.00 (19-43) (Table 2) but the difference was not found to be statistically significant. However statistically significant differences were seen between the groups for certain items within the domain. "Nutrition counseling should be part of routine care by all physicians, regardless of specialty" was found to be significantly higher for Interns-IC, median score= 4 (2-5) compared to Interns-DC, median score = 4 (1-5). "It is not worth the time to counsel patients with poor dietary patterns about nutrition" was negatively scored. Interns-DC had a median score of 2 (1-4) while Interns-IC had a median score of 4 (1-5). Similarly, "For most patients, health education does little to promote adherence to a healthy lifestyle" had a score of 2 (1-5) for Interns-DC while it was 3 (1-4) for Interns-IC. However, for the item "Patients will rarely change their behavior if they do not have active symptoms of a disease", Interns-DC score was 4.0 (1-5) while Interns-IC was 2 (1-4).

Table 1: Interns attitude towards Nutrition and Nutrition counseling

Statement	Median scores	
	Interns-DC	Interns-IC
1. Nutrition counseling should be part of routine care by all physicians, regardless of specialty.	4	4
2. Nutrition counseling is not an effective use of my professional time*.	4	4
3. All physicians should counsel high-risk patients about dietary change.	5	5
4. It is not worth the time to counsel patients with poor dietary patterns about nutrition*.	2	4
5. A change toward a healthier lifestyle is important at any stage of life.	5	5
6. Most physicians are not adequately trained to discuss nutrition with patients*.	3	2
7. Specific advice about how to make dietary changes will help patients improve their eating habits.	4	4
8. Physicians can have an effect on a patient's dietary behavior if they take the time to discuss the problem.	4	4
9. For most patients, health education does little to promote adherence to a healthy lifestyle*.	2	3
10. Patients will rarely change their behaviour if they do not have active symptoms of a disease*	4	2

Scored from Strongly Disagree (1) to Strongly Agree (5). \*Reverse scored.

Table 2: Total scores in the various domains compared between Interns-DC and Interns-IC.

	Domain	Interns-DC		Interns-IC		Total		p
		Score	Range	Score	Range	Score	Range	
1	Attitude to nutrition	33.50	25-38	36.00	19-43	35.00	19-43	0.080
2	Perceptions regarding Nutrition-related Knowledge	35.50	26-44	39.00	25-52	39.00	5-52	0.011*
3	Perceptions regarding Nutrition-related competences	55.50	15-69	59.00	40-74	57.00	15-74	0.352
4	Practice with respect to nutrition	21.00	5-25	19.00	10-25	20.00	5-25	0.034*

\*statistically significant

**Nutrition Knowledge:** Perceptions of knowledge in nutrition related topics as a was good for both groups, Median score was 4 for almost all items (Table 3). For “Potentially harmful interactions between medications and food/herbal supplements” both groups of interns were unsure (Median score=3) regarding their knowledge. Total scores in the knowledge domain were significantly higher (39) in Interns-IC compared to Interns-DC who had a score of 35.5 (Table 2).

Table 3: Perceptions regarding Nutrition Knowledge

Not knowledgeable (1) -----(5) Very knowledgeable	Median score	
	Interns-DC	Interns-IC
1. Nutritional requirements at various stages of life	3	4
2. Role of omega 3, omega 6 and trans fatty acids in heart health	4	4
3. Potentially harmful interactions between medications and food/herbal supplements	3	3
4. Nutrition concerns of patients with GI intolerances, maldigestion and malabsorption	4	4
5. Recognizing warning signs and symptoms of eating disorders	4	4
6. Role of fiber and phytonutrients such as carotenoids and flavonoids in health	4	4
7. Moderate alcohol consumption and its role in health and disease	4	4
8. Indications for enteral and parenteral nutrition	4	4
9. Dietary cholesterol and saturated fat and their role in elevating body lipids	4	4
10. Dietary habits that increase cancer risk	4	4
11. Nutritional considerations in patients with chronic renal disease	3	4

**Nutrition-related competences:** Perceptions regarding nutrition related competences were good for both groups with median scores of 4.0 for all items except one (Table 4).

“Assessing fluid requirements based on activity and health” received a score of 3.0 in Interns-DC compared to 4.0 in Interns-IC. In terms of total domain scores, Interns-IC score was higher, however the difference was not found to be statistically significant (Table 2).

Table 4: Perceptions regarding nutrition-related skills/competences

Confidence with regard to the following on a scale from 1-5 Not confident (1) .....Very confident (5)	Median score	
	Interns-DC	Interns-IC
1. Taking a dietary history of a patient	4	4
2. Calculating and interpreting body mass index and waist hip ratio	4	4
3. Assessing and counseling overweight patients regarding lifestyle changes	4	4
4. Providing advice to parents on healthy food choices and feeding practices.	4	4
5. Providing examples/suggesting foods for patients based on the food plate	4	4
6. Identifying and advising individuals at risk for nutrient deficiency	4	4
7. Recognizing nutritional anemia in children and adults	4	4
8. Assessing fluid requirements based on activity level and health	3	4
9. Discussing strategies for osteoporosis prevention and treatment including nutrition and lifestyle aspects	4	4
10. Recommending dietary patterns for patients with hypertension	4	4
11. Recognizing nutritional risk in elderly patients and adolescents	4	4
12. Providing nutritional strategies for patients losing weight due to chronic illness	4	4
13. Recommending dietary patterns for patients with type 2 diabetes	4	4
14. Prescribing single (B, C etc.), multivitamin and mineral supplements	4	4
15. Advising patients with chronic diseases (e.g. Diabetes) on dietary adjustment while fasting for religious obligation (e.g. During Ramadan)	4	4

**Practice related to nutrition:** The total domain score for the practice related to nutrition was 21 for Interns-DC while it was 19 for the Interns-IC (Table 2). This was the only domain where the Interns-DC had a total score higher than Interns-IC and the difference was statistically significant. “Encourage patients to ask diet related questions” with median scores of 4.0 in both groups and “Whenever possible recommend dietary changes prior to initiating drug therapy” with median scores of 4.0 and 3.0 in Interns-DC and Interns-IC were two items where statistically significant difference was observed between the two groups (Figure.1).

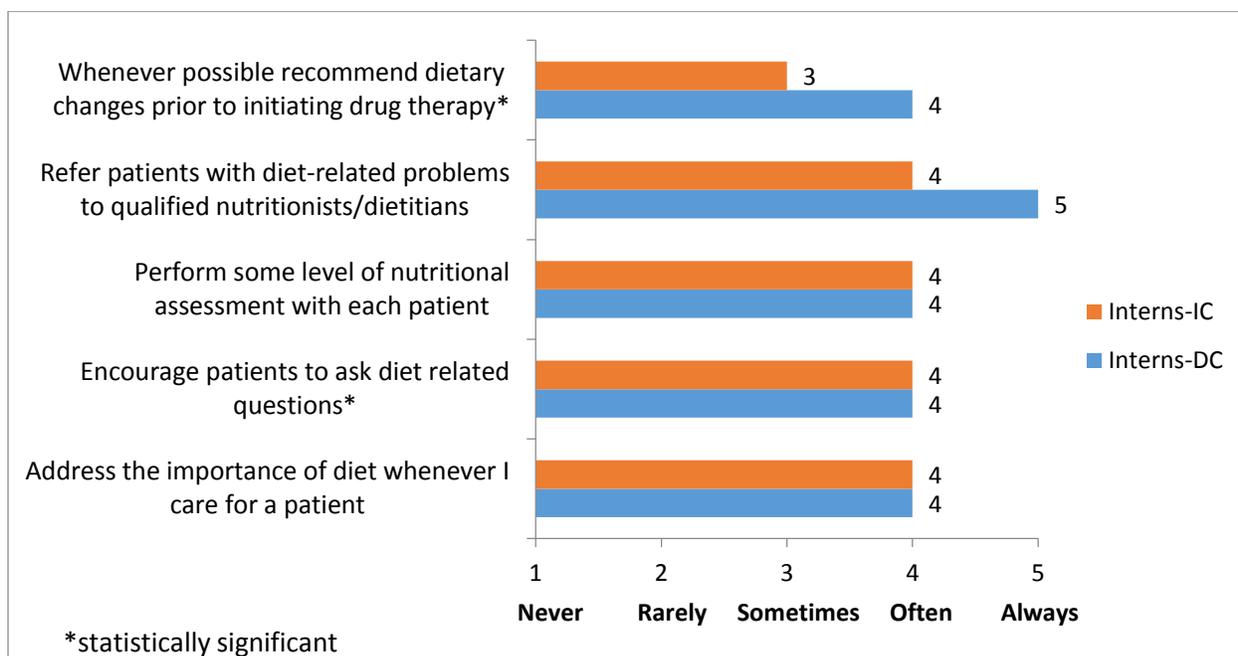


Figure 1. Nutrition- related practice

**Perceptions regarding Nutrition education:**

Both groups of interns were uncertain (Median score =3) regarding the quantity and quality of nutrition education. As shown in Table 5, the total domain scores were 22.5 and 21 respectively and there was no significant difference between Interns-DC and Interns-IC.

Table 5. Perceptions regarding nutrition education

Domain	Interns-DC		Interns-IC		Total		p
	Score	Range	Score	Range	Score	Range	
Perceptions regarding Nutrition education	22.50	10-30	21.00	12-29	21.00	10-30	0.453

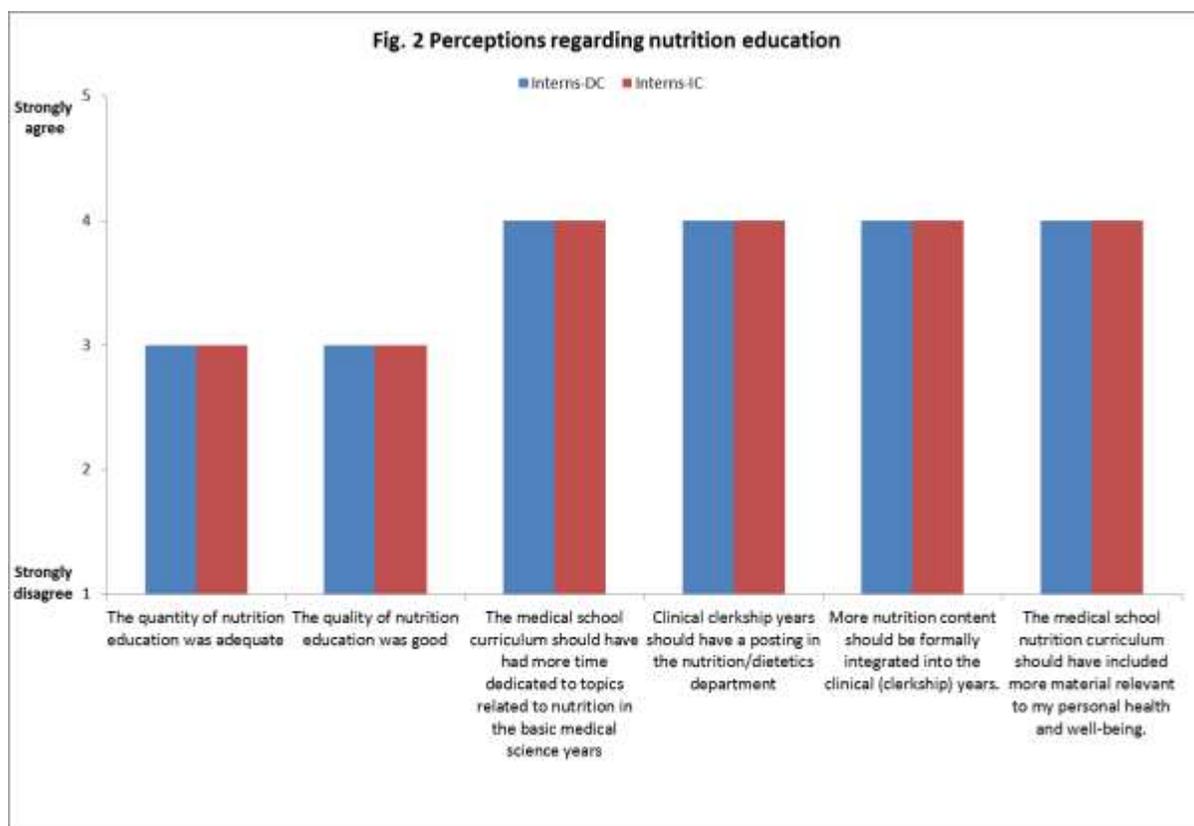


Figure 2. Perceptions regarding nutrition education

As shown in Figure 2, both groups of interns felt a need for more nutrition education (Median score=4) in basic medical science years, during clinical clerkships as well as a need for material related to their personal health and well-being.

Interns were asked to select areas that required more nutrition instruction from a list provided. Even though in almost all areas lesser number in Interns-IC mentioned requiring more instruction, the difference was not found to be statistically significant except for Evidence based nutrition (Figure 3).

Space was provided for free response regarding suggestions to improve nutrition education but there were no responses.

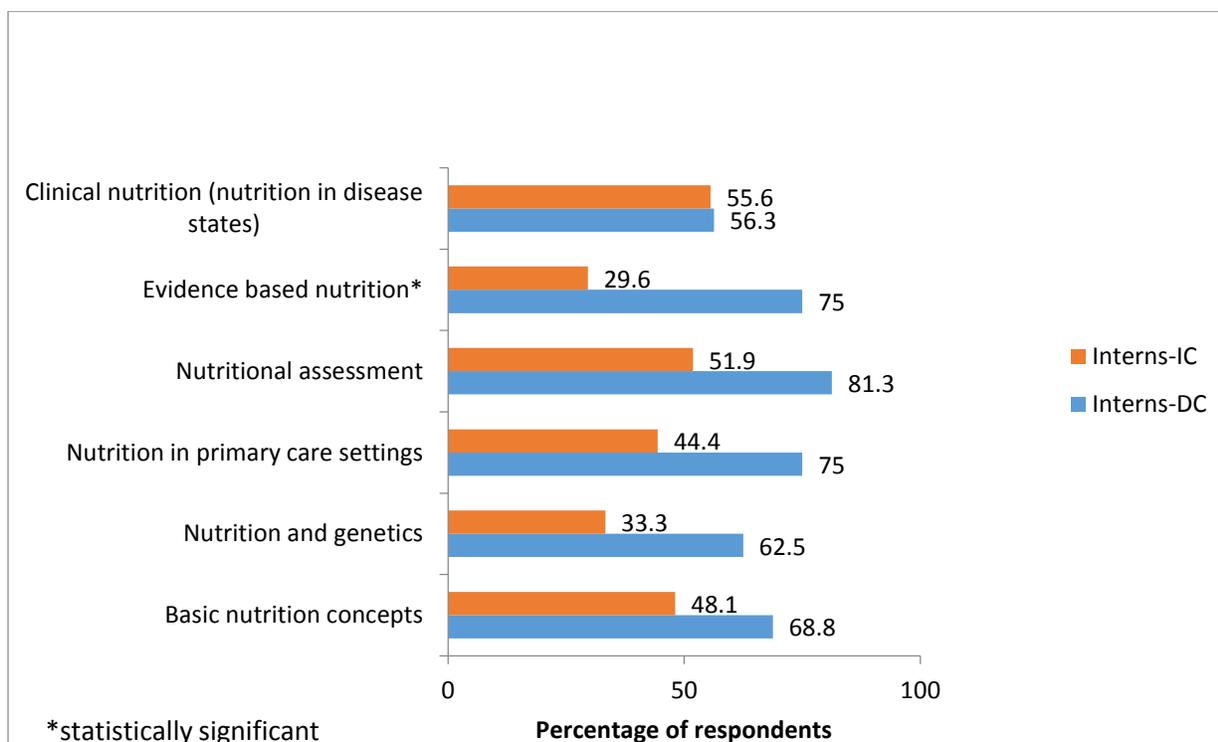


Figure 3. Nutrition-related areas identified as requiring more instruction

**Participant characteristics:** 61.9% and 60.6% were males in Interns-DC and Interns-IC respectively. Age ranged between 22 and 34 years. No differences were observed in any of the domains between the genders. Further, interns were asked to list their intended specialty. 36.4% of the interns listed Medicine or allied specialties while 20.0% listed Surgery and allied specialties. A very large number 43.6% were undecided. No differences were observed in any of the domains with respect to specialty. In terms of specific items in the knowledge domain, scores for “Role of omega 3, omega 6 and trans fatty acids in heart health”, “Nutrition concerns of patients with GI intolerances, maldigestion and malabsorption”, “Dietary habits that increase cancer risk” and “Indications for enteral and parenteral nutrition” and in the practice domain “Refer patients with diet-related problems to qualified nutritionists/dietitians” were found to be significantly higher in the Surgical and allied specialties group compared to Medicine and allied specialties.

## DISCUSSION

This study was conducted to compare the perceptions, regarding nutrition and nutrition education in the curriculum, of medical interns who had undergone the DC or the IC of GMU. Previous studies with medical graduates from earlier batches of the discipline based curriculum had shown that most medical graduates perceived nutrition education to be inadequate<sup>4</sup>. However, the study had only surveyed perceptions with respect to adequacy and the need for more nutrition education and the areas in which more nutrition was needed. In this study, perceptions regarding specific aspects nutrition-related knowledge, competences and practice were compared between the interns from the DC and the IC.

Interns from both groups had positive perceptions regarding the role of the doctor in nutritional counseling. There were no differences in the domain scores suggesting that

there were no significant differences in attitude towards nutrition. Interns from both groups agreed that 'nutritional counseling should be a part of routine care by all physicians', and that 'high risk patients should be counseled about dietary change'. They also felt 'a change toward healthier lifestyle is important at any stage in life'. This positive attitude towards nutrition counseling is very encouraging. This compares well with the results obtained in our earlier study with the medical graduates where 80% of the respondents had felt nutrition education to be very important for doctors<sup>4</sup>. Many interns in this study agreed that 'specific advice about how to make dietary changes will help patients improve their eating habits' and 'physicians can have an effect on a patient's dietary behavior if they take the time to discuss the problem' however the responses for 'health education does little to promote adherence to a healthy lifestyle' and 'it may not be worth the time to counsel patients with poor nutritional habits regarding nutrition' were mixed. This suggests a perception that while general health education may not work, specific advice regarding dietary changes could help improve patients dietary habits. In their study using items from the 'Nutrition in patient care' survey Walsh et al.<sup>6</sup> had reported that changing the curriculum did not result in any changes in attitude which is similar to our observations.

Most interns from both groups perceived themselves as having adequate knowledge regarding most aspects of nutrition related knowledge. Difference observed between the two groups was in two items 'nutritional requirements at various stages of life' and 'nutritional considerations in chronic kidney disease' where the median score of the Interns-DC was 3.0 compared to 4.0 in the Interns-IC group. Both groups were unsure of their knowledge regarding 'interactions between medications and food/herbal supplements'. A significant difference was observed in the nutrition-related knowledge domain scores with the Interns-DC having a significantly lower score than the Interns-IC. While most concepts in the IC were also a part of DC and learnt in different disciplines, introduction of the "Metabolism and Nutrition" course in IC may have increased the emphasis. Our observations are similar to Taren et al.<sup>7</sup> and Hodgson et al.<sup>8</sup> who report improvement in perceptions regarding nutrition knowledge as well as in test scores in nutrition-related OSCE with the implementation of an integrated nutrition curriculum. All interns felt confident regarding most nutrition-related competencies. There were no differences between the groups in the domain scores. This is extremely encouraging and suggests that most nutrition-related competencies appear to have been addressed in both curricula.

Regarding nutrition-related practice, both groups addressed diet when caring for patients, performed some level of nutritional assessment with each patient, and encouraged patients to ask diet-related questions. This was the only domain where the Interns-DC scored significantly higher than Interns-IC. In terms of specific items, more Interns-DC 'recommend dietary changes prior to initiating drug therapy' and wherever possible recommend dietary changes prior to initiation of drug therapy. With the available information, we are unable to explain this observation.

In spite of perceptions of adequate knowledge and competences in most nutrition-related areas, both groups of interns were unsure about the quality and quantity of nutrition education. Total domain scores did not differ significantly. However interns from both groups felt that more time was needed for nutrition both during the basic medical sciences as well as clinical clerkship years. They also as felt more material relevant to their

personal well-being should have been included in the curriculum. This agrees with our earlier studies with medical graduates<sup>4</sup> as well as reports in literature where lack of confidence in basic nutrition counseling due to perceived inadequate nutrition training in the medical school has been reported by physicians. About half the graduating medical students were found to rate their nutrition knowledge as inadequate<sup>9,10</sup>.

When asked to identify the nutrition-related topics that required more instruction, fewer Interns-IC interns identified most topics compared to Interns-DC. However the difference was found significant only for 'evidence based nutrition'. The number of interns identifying 'Clinical nutrition' as requiring more instruction was the same in both groups. In fact in the Interns-IC group, 'Clinical nutrition' became the topic identified by most. This corresponds reasonably well with areas identified by medical graduates in our earlier study which were Clinical Nutrition, Nutrition in primary care settings and Evidence based nutrition<sup>4</sup>. Self-reported proficiency of medical students has been reported by to be lowest for nutrition and disease management, micronutrients and alternative and complementary medicine<sup>11</sup>.

In the IC compared to DC, changes in the teaching and learning of nutrition have occurred mainly in the pre-clinical years. Learning in the clinical clerkships has not changed significantly. This could be one of the reasons for similar perceptions regarding Clinical Nutrition (nutrition in disease states). Studies by Taren et al.<sup>7</sup> and Hodgson et al.<sup>8</sup> have also shown a need for extending the nutrition education into the clerkship years. Friedman et al. have also suggested a need for vertical integration<sup>12</sup>. Newer models for teaching and learning of Nutrition have been suggested to not only promote competences in the doctor but also as a model for promoting interprofessional team-based care<sup>13,14</sup>.

## CONCLUSION

Changing the curriculum did not bring about significant changes in attitudes regarding nutrition or perceptions regarding nutrition-related competences. However, a significant difference was seen in perceptions regarding nutrition knowledge. Interns from both groups perceived a need for more nutrition education. Clinical nutrition and Nutritional assessment continue to be areas in the IC where more than half the interns feel more instruction is needed.

## LIMITATIONS OF THE STUDY

The number of interns graduating from the Gulf Medical University is limited and so the survey could be conducted only on small numbers of interns. All results are based on responses of the graduates.

## RECOMMENDATIONS

There is a need for longitudinal integration of nutrition into the clerkship years with a focus on nutritional assessment and nutritional management in disease states. Other specific topics highlighted by this study as inadequate could be included into the curriculum.

**ACKNOWLEDGEMENT**

We wish to thank the GMU interns for completing the survey. We also wish to thank Ms Sherly Ajay, academic coordinator, Mr Celso and Ms Mikaila, coordinators at the Umm Al Quwain hospital and Khalifa hospital and Mr Santosh coordinator at the Mafraq hospital for their help.

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