

Knowledge, Perception and Attitude of Pharmacists, Nurses and Doctors about Home-Care Medical Devices in Sharjah and Ajman, UAE

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Abstract

Background: Medical Equipments are designed to aid in the diagnosis; monitoring or treatment of medical conditions. Upgrades in technology also help continuously educate healthcare professionals. Where previously the use of devices like “mercury sphygmomanometers” is common place, they are now being replaced by either aneroid or “mercury-free” devices. It indicates the development of technology in this area. However, trends show that healthcare professionals still seem to trust “old school” equipment a lot more. Thus, it would be motivating to see why healthcare professionals have such engrained perceptions regarding medical equipment and to be able to investigate their knowledge about current medical devices and what their thoughts are on new technology available in this area. **Objectives:** This research is designed with an aim to gauge perception and knowledge of targeted HCPs on the risks, benefits, issues, usage and perception on the difference between older medical equipment and the newer ones with state of the art technology available in the market. **Methods:** A cross-sectional study using a 34 item questionnaire was used to survey a convenient sample of nurses, pharmacists and doctors across community practices in Ajman and Sharjah, UAE. **Conclusion:** Discouraging HCP’s from a long standing bias towards certain brands may lead towards better therapeutic outcomes for patients. Also, comments from HCP’s prove that HCP’s in these Emirates really do care for their patients and overall improvement of the health care industry.

Keywords

Knowledge, Perception, Medical Device, Healthcare Professionals, Healthcare Industry

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1. Introduction

The Food and Drug Administration, Center for Devices and Radiological Health (FDA, CDRH) defines home care/use medical devices as a medical device intended for users in a non-clinical or transitory environment, is managed partly or wholly by the user, requires adequate labeling for use, and may require training by the licensed health care provider in order to be used safely and effectively [1]. In simpler terms, home care medical device refers to those devices that a patient purchases to take home for either their chronic illness or to monitor conditions, such as fever, weight gain, and blood pressure monitoring. Home-use medical devices fall within an area where medical devices overlap consumer products [2].

It is also easy to state that the healthcare industry occupies a large part of the world from an economical aspect considering global revenue for makers of medical equipment and supplies is about \$340 billion [3]. A major portion of the markets include the US, Japan, Germany, France, and Italy [3].

Furthermore, patient-centered in-home care for individuals with diabetes, heart disease, and other chronic conditions is ideal for most patients. Indeed, home care is often seen as less costly and more patient-friendly [4]. Now, technology is advancing to meet the challenge with medical devices in the home that quickly and easily link to electronic health provider records [5]. It is critical not only to collect the data from these devices, but to seamlessly provide that information through common practices between nursing services, doctors, hospitals, pharmacies, insurance companies, and other care providers [5]. According to the World Health Organization, there are 1 billion overweight adults, 860 million chronic disease patients, and 600 million people over age 60 worldwide. Records show that chronic disease management consumes up to 85% of total healthcare spending, displaying a larger portion of the healthcare spending and the necessity of these devices for the improvement of quality in life amongst patients [5]. Furthermore, the growth of technology in home care means that lay people with varying levels of technical skills and education become direct users of health technology [6]. Hence, the only people gauging patient feedback in regards to these devices, are healthcare professionals.

On the other hand, the presence of these devices is economically more beneficial to patients since, for example, devices like blood pressure cuffs, pulse oximeters, and glucose meters are available for less than the cost of a single doctor's visit. Other possible requirements for chronic care monitoring can include a weight scale, fitness equipment, a pedometer, a pressure switch on a bed that monitors sleep, or motion sensors to monitor activity in a house [5]. These products also provide important information about a patient's health [5].

Previously conducted researches have focused on both the risks and benefits of using medical equipment along with medicines, but this does not truly give light to the perceptions of HCP's regarding medical equipment at least in the Gulf Region. Consequently, the rationale of this present study was to explore the Knowledge, perception and attitude about medical devices amongst Healthcare professionals (HCP's), nurses, pharmacists and physicians (who are majorly in contact with medical devices and are usually the ones that show their patients how to use them) in Sharjah and Ajman, United Arab Emirates. The objectives were to investigate an in depth perspective of HCP's on their experience; to gauge their satisfaction with current technology; elicit their opinion and attitude with medical devices.

2. Method

A cross-sectional study using a 34 item questionnaire was used to survey a convenient sample of nurses, pharmacists and doctors across community practices in Ajman and Sharjah, UAE.

A questionnaire was first designed to retrieve data from the expected sample pool. The questionnaire covered sections on the pools' demographics, their performance and experience, overall satisfaction with the available technology of medical devices and opinions and attitudes. For most questions, the respondents were asked to rate their response using the options "strongly agree", "agree", "Undecided", "disagree" and "strongly disagree". There are many examples in literature to support the use of a five-choice (Likert) scale. There was also a section inviting comments at the end of questionnaire. (A copy of the questionnaire is available in the [Appendix I](#)).

The poor response rate expected from using postal service for the distribution of questionnaires necessitated face to face visits to the pharmacies, hospitals and clinics. In order to increase the response rate, the non-respondents were reminded by telephone and a personal visit to complete the form, which was then collected in a week's time. However, due to the reluctance of many of the pharmacists, nurses, and doctors approached, a sample of only 89/200 participants from throughout Ajman and Sharjah responded and completed the survey during the study period.

There is no requirement to obtain ethical approval for such a study in the UAE, however, before every participant was interviewed, informed consent was obtained from them. They were educated about their anonymity on participation in the study, and that their responses would be used for educational purposes. The study was carried out over a period of five months (January to May, 2013).

2.1. Validity and Reliability Testing

The validity of an instrument is the extent to which it actually measures what it is designed to measure [7]. Evidence of validity may be gained through observation, expert lay judgment, and empirical inquiry. To ensure the face validity of the series of questions prepared for this study, the questionnaire was submitted to a group of 5 individuals from different parts of the medical field; two community pharmacists, a doctor, a nurse and a general manager who works in the medical device industry. All of their views and comments were considered and incorporated into the final version of the questionnaire. To assess test-retest reliability, the questionnaire was sent on two separate occasions to 5 individuals randomly chosen in an area of study interest. The second response was elicited three weeks after the initial test. No problems were highlighted, and test-retest reliability was calculated using Spearman's correlation coefficient (r). The rho value was 0.87, which implies an acceptable level of test re-test reliability. The alpha coefficient was 0.71; indicating that all of the items included make a valid contribution to the overall score.

2.2. Data Analysis

The participants' responses were encoded and the data were analyzed using Statistical Package for the Social Sciences (SPSS, version 20.0, Chicago, IL, US).

When analyzing the data, the responses from the five-point scale were reduced to three categories: strongly agree/agree, Undecided, and strongly disagree/disagree. This enables more reader comprehensible confidence intervals for the relative proportions to be calculated.

Descriptive analysis was used to calculate the proportion of each group of respondents who agreed/disagreed with each statement in the questionnaire. Also, Chi Square test was used to identify any significant difference among the participants' responses regarding certain statements or questions in the questionnaire with a significant level of p value of <0.05 .

3. Results

A total of 89 of the 200 questionnaires were returned, giving a response rate of 44.5 percent over the study period of five months [January to May, 2013]. Some of the HCPs who declined to take part in the study interestingly said or wrote comments on the questionnaire. These included: "*sorry, I am very busy*", "*it will take a long time to solve*", "*I am not interested in solving questionnaires*", and "*please go ask someone else to help you*".

3.1. Demographics

Of the 89 returned questionnaires, more than half 47 (52.8%) were pharmacists, 25 (28.1%) were nurses and 17 (19.1%) were physicians. Fifty five (61.8%) of the respondents were female. The majority 78 (87.6%) of the sample pooled were in the age range from 20 years to 50 years and less than half 41 (46.1%) were in the experience bracket of 1 - 10 years during the time of the study. The nationality of HCPs under investigation comprised (59, 66.3%) and (12, 13.5%) from Eastern Asia and Arabs originating from Africa respectively. **Table 1** describes the characteristics of our study population.

The frequency of occupation of 55 female HCPs included in the study was eight physicians, twenty five pharmacists, and twenty two nurses. In contrast, 34 male respondents comprised 9 physicians, 22 pharmacists, and 3 nurses. The differences in gender distribution according to their occupation were statistically significant ($p = 0.006$). **Table 2** summarizes the proportion and significance difference of HCPs' gender, years of experience and their field of practice (occupation).

3.2. Evaluating Performance/Experience

The majority of the respondents (82, 92.1%) either strongly agreed or agreed on the statement "I understood

Table 1. Healthcare professionals' demographic information (n = 89).

Demographic characteristic	n(f)	%
Age		
• 20 - 30	27	30.3
• 31 - 40	32	35.9
• 41 - 50	19	21.3
• 51 - 60	10	11.3
• 61 - 65	1	1.2
Occupation		
• Nurse	25	28.1
• Pharmacist	47	52.8
• Physician	17	19.1
Experience		
• 1 - 10	41	46.1
• 11 - 20	28	31.5
• 21 - 30	15	16.9
• 31 - 40	5	5.5
Nationality according to region:		
• Eastern Asia	59	66.3
• Iraq and GCC countries	10	11.3
• Arab countries in Africa	12	13.4
• Arab countries in Middle East	8	9.0
Gender		
• Female	55	61.8
• Male	34	38.2
Emirate		
• Sharjah	47	52.8
• Ajman	42	47.2

Table 2. Proportion and significance difference of HCPs' gender, years of experience in their fields of practice.

	Physicians n (%)	Pharmacists n (%)	Nurses n (%)	p-value
Gender:				
Male	9 (26.5)	22 (64.7)	3 (8.8)	0.01
Female	8 (14.5)	25 (45.5)	22 (40.0)	
Years of Experience:				
1 - 10 Years	3 (7.3)	29 (70.7)	9 (22.0)	0.01
11 - 20 Years	6 (21.4)	14 (50.0)	8 (28.6)	
21 - 30 Years	6 (40.0)	3 (20.0)	6 (40.0)	
31 - 40 Years	2 (50.0)	0 (0)	2 (50.0)	
Above 40 Years	0 (0)	1(100)	0 (0)	

p value (p < 0.05), 95% Confidence interval for single proportion (%) of respondents who either strongly agreed or agreed with the each statement.

what is meant by 'home-care' medical devices". Almost three quarter 66 (74.2%) of studied sample either agreed or strongly agreed that they interact with medical devices on an everyday basis. However, more than three quarter 69 (77.5%) and 70 (78.7%) reported that they either agreed or strongly agreed on the statement "I understand how to functionally use these devices" and the statement "I show my patient how to use these devices" respectively.

Interestingly, a high proportion 74 (83.1%) of the sample pooled either agreed or strongly agreed with the statement "I recommend that device that has trust worthy certificates". On the other hand, 70 (78.7%) and 72 (80.9%) reported that they believe that the devices are reliable machines and it is safe to be used to monitor patients' condition respectively (**Table 3**).

3.3. Satisfaction with Available Technology

Majority of the respondents (73, 82%) Strongly agreed/agreed with the statement that they are "satisfied with the

Table 3. Participants' perception on performance/experience with medical devices.

Statement	Strongly agree/agree n (%) (95% CI)	Undecided n (%)	Strongly disagree/disagree n (%)	p-Value
I understand what is meant by home care devices				
Physicians	15 (88.2)	2 (11.8)	0 (0)	0.43
Pharmacists	45 (95.7)	2 (4.3)	0 (0)	
Nurses	22 (88.0)	2 (8.0)	1 (4.0)	
Total (95% CI)	82 (92.1) (86.5 - 97.7)	6 (6.7)	1 (1.1%)	
I interact with them on every day bases				
Physicians	11 (64.7)	5 (29.4)	1 (5.9)	0.11
Pharmacists	39 (83.0)	4 (8.5)	4 (8.5)	
Nurses	16 (64.0)	8 (32.0)	1 (4.0)	
Total (95% CI)	66 (74.2) (65.1 - 83.2)	17 (19.1)	6 (6.7)	
I understand how to functionally use these devices				
Physicians	11 (64.7)	5 (29.4)	1 (5.9)	0.62
Pharmacists	39 (83.0)	6 (12.8)	2 (4.3)	
Nurses	19 (76.0)	5 (20.0)	1 (4.0)	
Total (95% CI)	69 (77.5) (68.9 - 86.2)	16 (18.0)	4 (4.5)	
I show my patient how to use these devices				
Physicians	12 (70.6)	4 (23.5)	1 (5.9)	0.18
Pharmacists	40 (85.1)	4 (8.5)	3 (6.4)	
Nurses	18 (72.0)	7 (28.0)	0 (0)	
Total (95% CI)	70 (78.7) (70.2 - 87.1)	15 (16.9)	4 (4.5)	
As HCP, believe these devices are safe for my patient				
Physicians	15 (88.2)	2 (11.8)	0 (0)	0.37
Pharmacists	39 (83.0)	8 (17.0)	0 (0)	
Nurses	18 (72.0)	7 (28.0)	0 (0)	
Total (95% CI)	72 (80.9) (72.8 - 89.0)	17 (19.1)	0 (0)	
HC devices are reliable machines for monitoring my patients' condition				
Physicians	13 (76.5)	4 (23.5)	0 (0)	0.87
Pharmacists	38 (80.9)	9 (19.1)	0 (0)	
Nurses	19 (76.0)	6 (24.0)	0 (0)	
Total (95% CI)	70 (78.7) (70.2 - 87.1)	19 (21.3)	0 (0)	
I recommend the device that has trust worthy certificates				
Physicians	14 (82.4)	2 (11.8)	1 (5.9)	0.49
Pharmacists	40 (85.1)	4 (8.4)	3 (6.4)	
Nurses	20 (80.0)	5 (20.0)	0 (0)	
Total (95% CI)	74 (83.1) (75.4 - 90.8)	11 (12.4)	4 (4.5)	

p value ($p < 0.05$), 95% Confidence interval for single proportion (%) of respondents who either strongly agreed or agreed with the each statement.

technology available in Home care medical devices now days". When asked if there was "an improvement in technology of home care medical devices now compared to 10 years ago", more than three quarter of the respondents (80, 89.9%) agreed.

Interestingly, only a little more than half (59.6%) stated that "medical representatives introduced them to new technologies". More than half of them 69 (77.5%) of them relied on patient feedback about the devices other than advertisements. Surprisingly, about a quarter of the respondents (25, 28.1%) were undecided to the statement that "they understood the functions of different technologies available in these medical devices".

Respondents seemed divided in their opinion about the statement "I face more and more issues with home care medical devices due to newer technology" as only half of them (50, 56.2%) agreed to it. Sixty five of the respondents believed that it would be "beneficial for their patients if they were more involved in the design and overall output of these devices". An interesting pattern was noticed when respondents were asked if they preferred more "computerized devices" where a little more than half (55 (61.8%)) of the respondents agreed ([Table 4\(a\)](#) and [Table 4\(b\)](#)).

3.4. Opinions/Attitudes

About three quarter of the respondents (70, 78.7%) Strongly agreed/agreed that "having home care medical de-

Table 4. (a) Participants' perception on satisfaction of technology in medical devices. (b) Participants' perception on satisfaction of technology in medical devices.

(a)

Statement	Strongly agree/agree n (%) (95% CI)	Undecided n (%)	Strongly disagree/disagree n (%)	p-Value
I am satisfied with the technology available now days				
Physicians	12 (70.6)	4 (23.5)	1 (5.9)	0.47
Pharmacist	38 (80.9)	7 (14.9)	2 (4.3)	
Nurses	23 (92.0)	2 (8.0)	0 (0)	
Total (95% CI)	73 (82.0) (74.1 - 89.9)	13 (14.6)	3 (3.4)	
There is definite improvement in the technology in devices now than 10 years ago				
Physicians	16 (94.1)	1 (5.9)	0 (0)	0.56
Pharmacist	42 (89.4)	5 (10.6)	0 (0)	
Nurses	22 (88.0)	2 (8.0)	1 (4.0)	
Total (95% CI)	80 (89.9) (83.7 - 96.1)	8 (9.0)	1 (1.1)	
The medical Representative always updates me about new technology				
Physicians	9 (52.9)	7 (41.2)	1 (5.9)	0.54
Pharmacist	30 (63.8)	10 (21.3)	7 (14.9)	
Nurses	14 (56.0)	8 (32.0)	3 (12.0)	
Total (95% CI)	53 (59.6) (49.4 - 69.7)	25 (28.1)	11 (12.4)	
Besides advertising, I rely on my patients' feedback about the product				
Physicians	13 (76.5)	4 (23.5)	0 (0)	0.02
Pharmacist	41 (87.2)	4 (8.5)	2 (4.3)	
Nurses	15 (60.0)	10 (40.0)	0 (0)	
Total (95% CI)	69 (77.5) (68.9 - 86.2)	18 (20.2)	2 (2.2)	

p value ($p < 0.05$), 95% Confidence interval for single proportion (%) of respondents who either strongly agreed or agreed with the each statement.

(b)

Statement	Strongly agree/agree n (%) (95% CI)	Undecided n (%)	Strongly disagree/disagree n (%)	p-Value
I understand the function of different technologies available				
Physicians	8 (47.1)	8 (47.1)	1 (5.9)	0.09
Pharmacist	36 (76.6)	8 (17.0)	3 (6.4)	
Nurses	13 (52.0)	9 (36)	3 (12.0)	
Total (95% CI)	57 (64) (54.1 - 73.9)	25 (28.1)	7 (7.9)	
I face more and more issues because of the technology				
Physicians	8 (47.1)	7 (41.2)	2 (11.8)	0.17
Pharmacist	32 (68.1)	12 (25.5)	3 (6.4)	
Nurses	10 (40.0)	13 (52.0)	2 (8.0)	
Total (95% CI)	50 (56.2) (45.9 - 66.4)	32 (36.0)	7 (7.9)	
It is beneficial for me to be involved in the design of the product				
Physicians	12 (70.6)	3 (17.6)	2 (11.8)	0.93
Pharmacist	35 (74.5)	9 (19.1)	3 (6.4)	
Nurses	18 (72.0)	4 (16)	3 (12.0)	
Total (95% CI)	65 (73.0) (63.9 - 82.2)	16 (18)	8 (9.0)	
I prefer it when the device is more computerized				
Physicians	11 (64.7)	5 (29.4)	1 (5.9)	0.65
Pharmacist	31 (66)	10 (21.3)	6 (12.8)	
Nurses	13 (52)	9 (36)	3 (12)	
Total (95% CI)	55 (61.8) (51.8 - 71.8)	24 (27)	10 (11.2)	

p value ($p < 0.05$), 95% confidence interval for single proportion (%) of respondents who either strongly agreed or agreed with the each statement.

vices available to their patient, aid in patient assessment in the form of log books”. Majority of the respondents, 78 (87.6%) strongly agreed/agreed with the statement “home care medical devices improve their patients’ quality of life and overall health”. Significantly, only half (44, 49.4%) the respondents believed that “they like to focus on a specific brand of medical equipment for their patients”; while in another questions seventy three (82%) believed that the “brand of the device does not matter but the quality and reliability of the product does”.

Sixty one (68.5%) thought those “home care medical devices were economically profitable to their patients” while only half (50, 56.2%) that they were “*cost effective* to their patients”. Less than half (49, 55.1%) thought their patients could “easily afford such items for their home use”. 70 thought that the “home management industry has improved over the past 10 years”. Also, 78 (87.6%) of the respondents strongly agreed/agreed that “calibrating the devices from time to time ensured their patients’ safety”. Meanwhile, a major proportion of the respondents (70, 78.6%) used home care medical devices within a span of *daily to few times a week* (Table 5(a), Table 5(b), and Table 6).

Table 5. (a) Participants’ perception on opinions/attitudes about medical devices. (b) Participants’ perception on opinions/attitudes about medical devices.

(a)

Statement	Strongly agree/agree n (%) (95% CI)	Undecided n (%)	Strongly disagree/disagree n (%)	p-Value
Being HCP, the homecare medical devices available to your patients aids in your patient assessment while being away in the form of “Log Books”				
Physicians	14 (82.4)	3 (17.6)	0 (0)	0.64
Pharmacist	37 (78.7)	9 (19.1)	1 (2.1)	
Nurses	19 (76.0)	4 (16.0)	2 (8.0)	
Total (95% CI)	70 (78.7) (70.2 - 87.1)	16 (18.0)	3 (3.4)	
I feel having such devices available to my patient has improved their quality of life and overall health				
Physicians	14 (82.4)	2 (11.8)	1 (5.9)	0.59
Pharmacist	43 (91.5)	4 (8.5)	0 (0)	
Nurses	21 (84.0)	3 (12.0)	1 (4.0)	
Total	78 (87.6) (80.8 - 94.4)	9 (10.1)	2 (2.2)	
I prefer to focus on a specific “brand” of medical devices for my patients				
Physicians	7 (41.2)	4 (23.5)	5 (29.4)	0.12
Pharmacist	20 (42.6)	15 (31.9)	0 (0)	
Nurses	17 (68.0)	6 (24.0)	0 (0)	
Total (95% CI)	44 (49.4) (39.1 - 59.7)	25 (28.1)	1 (1.1)	
The brand of the device does not matter but the quality and reliability of the product does				
Physicians	14 (82.4)	0 (0)	3 (17.6)	0.17
Pharmacist	37 (78.7)	6 (12.8)	4 (8.5)	
Nurses	22 (88.0)	0 (0)	3 (12.0)	
Total (95% CI)	73 (82) (74.1 - 89.9)	6 (6.7)	10 (11.2)	
Such home care medical devices are economically profitable for my patients as they can record data at home and don’t have to visit the clinic as often				
Physicians	12 (70.6)	4 (23.5)	1 (5.9)	0.11
Pharmacist	35 (74.5)	10 (21.3)	2 (4.3)	
Nurses	14 (56)	5 (20)	6 (24)	
Total (95% CI)	61 (68.5) (58.9 - 78.1)	19 (21.3)	9 (10.1)	

p value (p < 0.05), 95% confidence interval for single proportion (%) of respondents who either strongly agreed or agreed with the each statement.

(b)

Statement	Strongly agree/agree n (%) (95% CI)	Undecided n (%)	Strongly disagree/disagree n (%)	p-Value
I feel the prices that many of the devices that are available in the market are cost effective				
Physicians	10 (58.8)	7 (41.2)	0 (0)	0.229
Pharmacist	28 (59.6)	11 (23.4)	8 (17.0)	
Nurses	12 (48.0)	7 (28.0)	6 (24.0)	
Total (95% CI)	50 (56.2) (45.9 - 66.4)	25 (28.1)	14 (15.7)	
My patient can easily afford such items for their home use				
Physicians	10 (58.8)	7 (41.2)	0 (0)	0.392
Pharmacist	27 (57.4)	14 (29.8)	6 (12.8)	
Nurses	12 (48.0)	8 (32.0)	5 (20.0)	
Total (95% CI)	49 (55.1) (44.8 - 65.3)	29 (32.6)	11 (12.4)	
Home management industry has improved over the past 10 years				
Physicians	15 (88.2)	1 (5.9)	1 (5.9)	0.157
Pharmacist	36 (76.6)	11 (23.4)	0 (0)	
Nurses	19 (76.0)	6 (24.0)	0 (0)	
Total (95% CI)	70 (78.7) (70.2 - 87.1)	18 (20.2)	1 (1.1)	
Calibrating the medical device from time to time is important to ensure my patients safety				
Physicians	15 (88.2)	1 (5.9)	1 (5.9)	0.139
Pharmacist	43 (91.5)	4 (8.5)	0 (0)	
Nurses	20 (80.0)	5 (20.0)	0 (0)	
Total (95% CI)	78 (87.6) (80.8 - 94.4)	10 (11.2)	1 (1.1)	

p value ($p < 0.05$), 95% confidence interval for single proportion (%) of respondents who either strongly agreed or agreed with the each statement.

Table 6. How often do the HCP's use medical devices with their patients?

	Once or more times a day n (%)	A few times a week n (%)	A few times a month n (%)	Hardly ever n (%)	Never n (%)	p-Value (95% CI)
Physician	7 (41.2)	6 (35.3)	2 (11.8)	2 (11.8)	0 (0)	0.37 (31.4 - 51.8)
Pharmacist	15 (31.9)	22 (46.8)	7 (14.9)	2 (4.3)	1 (2.1)	
Nurse	15 (60.0)	5 (20.0)	4 (16.0)	1 (4.0)	0 (0)	
Total	37 (41.6)	33 (37.1)	13 (14.6)	5 (5.6)	1 (1.1)	

p value ($p < 0.05$), 95% confidence interval for single proportion (%) of respondents who either strongly agreed or agreed with the each statement.

3.5. View Point

This was an optional comment section of the questionnaire where respondents were asked "if they would suggest a device be invented which was not already available in the market". Although most of the respondents chose to leave this section empty, 33 (37.1%) answered where some of the responses consisted of: "cheap lipid profile devices", "digital BP devices for children", "accuracy in existing devices", "device calibrator", "improvement of Hault device", "a device that would let the person know he's about to have a heart attack", "hemoglobin and cholesterol kit", "non-invasive blood glucose testing", "simplified version of existing transdermal insulin device", "Bluetooth/wireless BP monitor".

When the respondents were asked to "write any final comments regarding the topic", majority of the responses consisted of, "Good project", "Good attempt", "your project has made me bring more attention to these services provided by the medical industry", "good survey", "well done", "well selected topic", "excellent topic to cover", "survey covered all major aspects of the topic".

4. Discussion

The response rate received was 44.5%. It can be assumed that the slightly low response rate is either due to the fact that healthcare professionals in these two Emirates are really busy or just have a lack of interest in studies that promote healthcare. Suggesting activities that enhance this interest and promote the need to advance in the field of healthcare may prove to be beneficial for all HCP's involved in the industry. It was also noticed, while conducting the research, that it was easier to approach pharmacists compared to physicians or nurses perhaps due to their availability in the community area while the other two are either in hospitals and clinics and appointments are needed to meet them. It may also be that physicians have a lack of time to spare from outside their patients while nurses were slightly more willing to stop and inquire about the questionnaire.

It was interesting to see that majority of the respondents were from East Asia (59, 66.3%) which may be due to their increasing population in the country or since most of the respondents were pharmacists, East Asians are seen more in this profession. It was also seen that more females willingly responded to the questionnaire than men which can be attributed to the fact that women were usually more approachable and want to help.

The positive aspect derived from this study was that majority of the participants (75%) responded in a positive nature towards the questions, which shows that as HCP's they look for what is best for their patients. Only in three questions was an accepted, significant difference seen in answers (chi square test, p value < 0.05); "gender (p value = 0.006)" experience (p value = 0.014)" "besides advertisements, I rely on my patients feedback about the device (p value = 0.022)", which indicates that even in different professions, their thought process and ability to understand these devices was similar. Furthermore, the fact that close to a quarter (16, 18%) of the respondents were undecided if they "fully understood how to functionally use these devices" indicates that they either are confused about the devices or medical representatives are not fully telling them about these equipment. This coincides with similar findings in the study where more than half (53, 59.6%) said that the medical representative updates or informs them about new technology or newer ways of using the device. This lack in the system can be avoided by advising medical representatives to perhaps spend more time with the HCP's so that concepts of the devices are more clear or holding seminars with HCP's that show the use of different devices and lets them practice. Perhaps introducing CME programs that cover such topics for Healthcare professionals will prove to be beneficial. This will ensure that the information is being passed equally to all HCP's and by practicing they will be able to guide their patients more fruitfully.

Although safety was previously the primary concern (for the purchase of medical devices), there is now a growing demand for data on efficacy and cost effectiveness to enable this selectivity [8]. It was hence noticed that only a little more than half (49, 55.1%) of the respondents thought that their patients could afford these home care devices. This can also be construed from a different angle where it can be assumed that perhaps HCP's may be biased towards long standing brands that are quite high in prices and only recommend those products to their patients. The ultimate aim of any prescribed medical therapy is to achieve certain desired outcomes in the patients concerned. These desired outcomes are part and parcel of the objectives in the management of the diseases or conditions [9]. Consequently, when the patient goes to the pharmacy or drug store to purchase this device, the price proves to be a hindrance or turn off as the patient does not realize that the device could be an investment in their health. Hence, overall a recommended reduction in price or perhaps a better variety in price range can be suggested so that patient compliance may be improved. A different angle to this point is also the fact that there is great emphasis on multinational companies to make sales and provide bigger figures hence enforcing healthcare professionals to recommend more expensive devices. However, Companies will have to adapt their marketing campaigns since cost savings, done correctly, will benefit everyone [10].

Recent decades have witnessed major advances in medical technologies that have been responsible for earlier and more accurate diagnoses, more effective treatments, and the ability of people to live longer, healthier lives [8]. More than half (55, 61.8%) responded that they would like to see more computerized devices or even prefer them. This can be construed positively as it shows that HCP's are interested in improving technology that improves quality of life. This increase in computerized devices will perhaps make things easier for the patient where only "one touch" application may increase patient compliance to monitor their conditions. It will also help the contact and relation between patient and HCP to improve since features like "Bluetooth or wireless" programs in the device will make it easier for the physician or pharmacist to be more aware of their patients' conditions. On the other hand, one can argue that the use of more sophisticated machines will increase confusion amongst patients as they will not always come out with the same readings due to either human error or machine

error.

The comments and the views received from the different HCP's indicates that they are willing to look further into the topic and that home care medical devices form an integral part of the health care industry. The fact that there were various suggestion to be included to the market of devices to be invented also shows that HCP's are looking for improvement in the industry and that they realize what is lacking in patient health in the form of devices.

5. Limitations of This Study

Despite the fact that self-administered questionnaires are often the only financially viable option when collecting information from a large population, it has been shown that this method of collecting data has some disadvantages. This was especially demonstrated when healthcare professionals did not spend enough time reading questions and considering them before answering. It was also seen that due to many constrains and limited period of time to conduct the study, it was not possible to approach a larger sample pool.

6. Future of the Study

It would be intriguing to study this area of the medical industry again by incorporate cultural aspects to questions which may affect the way HCP's from different cultures would give answers. Also, using a similar sample pool of pharmacists, physicians and nurses to be to compare answers in findings from other emirates, especially Abu Dhabi and Dubai would be interesting. One could gauge and see if perhaps city of practice may provide a change in responses.

7. Conclusion

This study has been able to explore the knowledge, perception and attitude of pharmacists, nurses and doctors about home-care medical devices in the Emirates of Sharjah and Ajman. It can also be suggested that the response rate may be improved by perhaps increase the study time dedicated to this study to more than five months. Discouraging HCP's from a long standing bias towards certain brands may lead towards better therapeutic outcomes for patients. Also, comments from HCP's prove that HCP's in these Emirates really do care for their patients and overall improvement of the health care industry.

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Appendix I

Knowledge, Perception and Attitude of Pharmacists, Nurses and Doctors about Home-Care Medical Devices in Sharjah and Ajman, UAE

The objective of this study is to establish the knowledge and perception of medical devices amongst healthcare professionals (HCP's), which includes doctors, pharmacists and nurses in the Northern Emirates of the United Arab Emirates. The other objective is to get an in depth perspective of HCP's on their experience, satisfaction with current technology and their opinion and attitude with medical devices. In this questionnaire, the term "Home-Care medical equipment" includes a wide list of equipment that your patient may take home to aid in the treatment/of their chronic illness or other conditions. These devices include for example, blood pressure monitors, nebulizers, glucometers, pulse oximeters, thermometers, weighing scales, pregnancy test kits. This questionnaire is for a study conducted by Ms. Hafsa Tayyab, a Bachelor's of Pharmacy student at Ajman University of Science and Technology, Faculty of Pharmacy. This study is part of her dissertation for her final year in the program. It will be highly appreciated if you could answer this questionnaire on receiving it, as being part of the healthcare community in the UAE.

1) Demographics:

Age:

20-30 30-40 40-50 50-60 60-65 Other

Gender:

Male Female

Occupation:

Doctor Pharmacist Nurse Other

Years of experience in the field:

1-10 years 10-20 years 20-30 years 30-40 years other

Specialization (If applicable): _____

Nationality: _____

City/Emirate: _____

2) Evaluating performance/experience:

Please choose only ONE answer by ticking in the appropriate box.

Statement	Strongly agree	Agree	Somewhat agree	Disagree	Strongly disagree
I understand what is meant by "home-care medical devices".	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I interact with "home-care" medical devices on an everyday basis.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I understand how to functionally use most of these "home care medical devices".	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I show my patients how to use the medical device before they take it home to use on their own.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
As a healthcare professional, I think home-care medical equipment is safe for monitoring my patient's conditions.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Home care medical devices are reliable machines for monitoring my patients' conditions.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I only recommend that device to my patient which has a trust worthy certificate and attestation. (e.g. CE mark, ISO: 13485, etc.).	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

3) Satisfaction with the available technology:

Please choose only ONE answer by ticking in the appropriate box.

Statement	Strongly agree	Agree	Somewhat agree	Disagree	Strongly disagree
I am satisfied with the technology in “Home care medical devices” available now days.					
There is a definite improvement in the technology of home care medical equipment available now than 10 years ago.					
Whenever a new technology is introduced in a medical device, the medical representative always updates me about it.					
Besides the advertising done for this new technology, I rely on my patients feedback about the device.					
I fully understand the function of different technologies <i>available</i> in different medical devices.					
Because of newer technology, I face more and more issues with this home care medical equipment (e.g. <i>data management, patient unable to use machine</i>).					
I think it would be beneficial for my patients if as a Healthcare Provider, I was more involved in the design and overall output of these “home care devices” as I understand what my patient needs.					
I prefer it when the medical device is more computerized (wireless, bluetooth) than simple.					

4) Opinions/attitudes questions:

Please choose only ONE answer by ticking in the appropriate box.

Statement	Strongly agree	Agree	Somewhat agree	Disagree	Strongly disagree
Being a Health care professional, having such “home care medical device” available to your patient, aids in your patient assessment while being away in the form of “Log Books”.					
I feel having such equipment available to my patients has improved their quality of life and overall health.					
I prefer to focus on a specific “brand” of medical equipment for my patients.					
As a health care professional, the “brand” of the devices does not matter to me but the quality and reliability of the product does.					
Providing your patients with such “Home care devices” is more economically profitable for my patients as they can record their data at home and don’t have to visit the Clinic as often.					
I feel the prices that many of these medical devices that are available in the market are cost effective to my patient.					
I feel my patient can easily afford such items for their home use.					
Home management industry has improved over the past 10 years.					
Calibrating the medical devices from time to time is important to ensure my patient’s safety.					

How often do you use medical devices with your patient?

- | | |
|---|--------------------------------------|
| <input type="checkbox"/> Once or more times a day | <input type="checkbox"/> Hardly ever |
| <input type="checkbox"/> A few times a week | <input type="checkbox"/> Never |
| <input type="checkbox"/> A few times a month | |

5) Your view

a) What kind of other equipment/devices would you suggest and see invented in the future that you feel are lacking in the market right now and will help your patients?

b) Do you have any final comments on this topic?
