

Effect of Implementation of Electronic File System and the Completeness of Clinical Evaluation in Chronic Non-Communicable Diseases Clinic

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Objective: To evaluate the effect of implementation of the Electronic File System (EFS) on the completeness of clinical evaluation in the Chronic Non-Communicable Diseases (NCD) Clinic.

Design: A Cross-Sectional, Comparative Study.

Setting: Health Center, Bahrain.

Method: All patients attending NCD clinic before implementation of Electronic File System (EFS) from 15 February to 31 March 2015 were reviewed and considered the first group (156). All patients attending NCD clinic after the implementation of EFS from 15 May to 30 June 2015 were reviewed and considered the second group (168). The clinical item evaluations to be completed by the physician were 9 items and by the nurse 30 items for each patient. The total number of clinical evaluation items before EFS multiplied by the number of cases (39×156) was 6,084. The total number of clinical evaluation items after EFS multiplied by the number of cases (39×168) was 6,552.

Results: Three hundred twenty-four patients were included in the study. The patients were divided into two groups, 156 (48.1%) before EFS and 168 (51.9%) after EFS. The completeness of clinical items evaluation improved after the implementation of the EFS from 3,684 (60.5%) to 4,224 (64.5%). The completeness by the nurse improved significantly after the implementation, from 2,988 (49.1%) to 3,653 (55.8%) and deteriorated by the physician from 696 (11.4%) to 571 (8.7%).

Conclusion: The average completeness of clinical evaluation remains low after the implementation of the EFS. There are several possible causes and further studies are needed to identify the main underlying causes for such low figures in order to plan and implement improvement.

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NCD includes cardiovascular diseases, cancer, diabetes and respiratory diseases. NCD is considered the main cause for approximately 60% of global mortality. In low and middle-income countries, it is up to 80%. In addition, they result in 47% of global burden of diseases. Furthermore, diabetes prevalence rate reached more than 20% in many Gulf Cooperation Council (GCC) States (12% to 25% in the age group 25 to 65 years). Five of the GCC States are among the top ten countries in the world reported by the International Diabetes Federation in 2010. In addition, 40% to 70% of people in the Gulf suffer from obesity, hypertension and smoking¹. Gulf Family Health Survey, more than 15 years ago, confirmed that cardiovascular diseases affect age group more than 40 years at rates ranging from 20% to 45%².

Data analysis showed that 59.2% of patients who attended NCD clinics in Bahrain had DM type 2 and 33% were hypertensive.

The objective of these clinics was to estimate the 10-year cardiovascular risk for these patients. The majority of patients had less than 10% CVD risk³.

During the visit to the NCD clinic, a trained staff nurse usually takes full medical history, weight, height, MBI, blood pressure, waist circumference, peripheral pulses and foot examination. The family physician conducts the followings: general examination, ECG, CX-RAY, patient assessment, estimates the 10-year cardiovascular risk factor, patient management, adherence to medications, immunization and patient management/counseling.

The aim of this study is to evaluate the effect of implementation of the EFS on the completeness of clinical evaluation in the NCD Clinic.

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METHOD

All patients attending NCD clinic before implementation of Electronic File System (EFS) from 15 February to 31 March 2015 were reviewed and considered the first group (156). All patients attending NCD clinic after the implementation of EFS from 15 May to 30 June 2015 were reviewed and considered the second group (168). The clinical item evaluations to be completed by the physician were 9 and by the nurse 30 for each patient. The total number of clinical item evaluation before EFS multiplied by the number of cases (39×156) was 6,084. The total number of clinical item evaluation items after EFS multiplied by the number of cases (39×168) was 6,552.

A special data collection form was designed including all the data of patients' item clinical evaluation by the staff nurse and the physician. Furthermore, the sample size in this study was achieved through a probability-based sampling approach. SPSS version 24 was used for analysis. Chi-Square test was used to test the statistical significance. Finally, P-value of 0.05 or less was considered as statistically significant difference.

RESULT

Three hundred twenty-four patients were included in the study. The first group included 156 (48.1%) patients and the second group included 168 (51.9%) patients, see table 1.

Table 1: Sample Size

Implementation of EFS	Frequency & Percentage
Before EFS	156 (48.1%)
After EFS	168 (51.9%)
Total	324 (100%)

The following items deteriorated after the implementation of the EFS: basic diagnoses, CV risk factors, weight, height, BMI, systolic BP, diastolic BP, pulses, retinal examination, fasting blood sugar, HbA1c, ACR/PCR, ECG, 10 Years cardiovascular risk factor, patient management, adherence to medications and immunizations. Chest X-Ray was done for 2 (1.2 %) patients and eGFR was not done for any patient over a period of one year.

The following clinical item evaluation data improved after the implementation of the EFS: history of current medications (hypoglycemic, insulin, antihypertensive, anti-hyperlipidemia, anti-microalbuminuria), symptoms of hypoglycemia, tobacco use, physical activities, waist circumference and patient management/counseling (statistically significant differences, P-value ≤ 0.05), see table 2.

The average overall completeness of clinical item evaluation improved after the implementation of the EFS from 3684 (60.5%) to 4224 (64.5%); it remains low, see table 3.

The completeness of clinical item evaluation performed by the staff nurse compared to the physician before implementation of EFS was 2,988 (49.1%) and 696 (11.4%) respectively; after the implementation of the EFS, it was 3,653 (55.8%) and 571 (8.7%) respectively, P-value 0.0001. The completeness

Table 2: Patients' Clinical Evaluations

Clinical Evaluation Performed	Before EFS (n:156)	After EFS (n:168)	Total (n:324)	P-value (2-sided)
Basic Diagnoses	155 (99.4%)	150 (89.3%)	305 (94.1%)	0.0001
CV Risk factors	15 (9.6%)	4 (2.4%)	19 (5.9%)	0.007
History of Hypoglycemic Drugs	124 (79.5%)	149 (88.7%)	273 (84.3%)	0.031
History of Insulin	23 (14.7%)	149 (88.7%)	172 (53.1%)	0.0001
History of Antihypertensives	102 (65.4%)	149 (88.7%)	251 (77.5%)	0.0001
History of Antihyperlipedemics	122 (78.2%)	149 (88.7%)	271 (83.6%)	0.016
Antimicrobialalbuminuria Drugs	5 (3.2%)	148 (88.1%)	153 (47.2%)	0.0001
Symptom of Hypoglycemia	24 (15.4%)	148 (88.1%)	172 (53.1%)	0.0001
Tobacco Use	19 (12.2%)	148 (88.1%)	167 (51.5%)	0.0001
Diet	130 (83.3%)	148 (88.1%)	278 (85.8%)	0.285
Physical Activities	55 (35.3%)	148 (88.1%)	203 (62.7%)	0.0001
Weight	154 (98.7%)	150 (89.3%)	304 (93.8%)	0.001
Height	151 (99.4%)	151 (89.9%)	302 (93.2%)	0.0244
BMI	154 (98.7%)	149 (88.7%)	303 (93.5%)	0.0006
Systolic BP	156 (100%)	150 (89.3%)	306 (94.4%)	0.0001
Diastolic BP	156 (100%)	150 (89.3%)	306 (94.4%)	0.0001
Waist Circumference	97 (62.2%)	134 (79.8%)	231 (71.3%)	0.0007
Pulses	148 (94.9%)	145 (86.3%)	293 (90.4%)	0.0151
Foot Examination	126 (80.8%)	142 (84.5%)	268 (82.7%)	0.455
Follow Up Vascular Surgery	108 (69.2%)	130 (77.4%)	238 (73.5%)	0.125
Retinal Examination*	126 (80.8%)	84 (50.0%)	210 (64.8%)	0.0001
Hemoglobin	4 (2.6%)	5 (3.0%)	9 (2.8%)	0.822
Fasting Blood Sugar	148 (94.9%)	143 (85.1%)	291 (89.8%)	0.0066
HbA1c	130 (83.3%)	61 (36.3%)	191 (59.0%)	0.0001
Cholesterol	138 (88.5%)	143 (85.1%)	281 (86.7%)	0.4702
LDL	134 (85.9%)	139 (82.7%)	273 (84.3%)	0.5303
HDL	136 (87.2%)	138 (82.1%)	274 (84.6%)	0.2713
Triglyceride	136 (87.2%)	142 (84.5%)	278 (85.8%)	0.5996
ACR/PCR*	10 (6.4%)	7 (4.2%)	17 (5.2%)	0.5120
eGFR*	0 (0.0%)	0 (0.0%)	0 (0.0%)	Not Valid
ECG*	15 (9.6%)	10 (6.0%)	25 (7.7%)	0.3048
CX-RAY*	3 (1.9%)	2 (1.2%)	5 (1.5%)	0.8619
General Examination	72 (46.2%)	86 (51.2%)	158 (48.8%)	0.4266
Patient Assessment	141 (90.4%)	156 (92.9%)	297 (91.7%)	0.5462
10 Years Cardiovascular Risk Factor	87 (55.8%)	14 (8.3%)	101 (31.2%)	0.0001
Patient Management	136 (87.2%)	105 (62.5%)	241 (74.4%)	0.0001
Adherence to Medications	111 (71.2%)	88 (52.4%)	199 (61.4%)	0.0008
Immunization	81 (51.9%)	4 (2.4%)	85 (26.2%)	0.0001
Patient Management / Counseling	50 (32.1%)	106 (63.1%)	156 (48.1%)	0.0001

* These evaluations are considered completed if were done within one-year period

Table 3: The Average Overall Completeness of Clinical Items Evaluation

Items Clinically Evaluated	Before I-Seha (6,084 Items)	After I-Seha (6,552 Items)
Done	3,684 (60.5%)	4,224 (64.5%)
By Nurses*	2,988 (49.1%)	3,653 (55.8%)
By Physicians**	696 (11.4%)	571 (8.7%)
Not Done	2,400 (39.4%)	2,328 (35.5%)

* Thirty Clinical Evaluation Items are usually conducted by the nurse 30x156.

** Nine Clinical Evaluation Items are usually conducted by the physician.

*** Total number of clinical evaluation items \times number of cases (39×156)

**** Total number of clinical evaluation items \times number of cases (39×168)

The two-tailed P-value is less than 0.0001.

of clinical item evaluation improved by the staff nurse significantly after the implementation of the EFS, from 2,988 (49.1%) to 3,653 (55.8%), but deteriorated by the physician from 696 (11.4%) to 571 (8.7%), see figure 1.

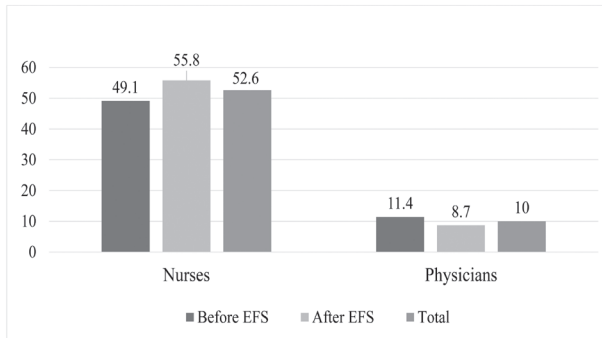


Figure 1: Nurses and Physicians Overall Completeness of Clinical Item Evaluation

Chronic illnesses were documented in 297 (91.7%) patients out of the total 324. The following were documented: 244 (75.3%) patients diabetes mellitus, followed by 204 (63%) dyslipidemia, 203 (62.7%) hypertension, 30 (9.3%) hypothyroidism, 23 (7.1%) obesity and 20 (6.2%) coronary artery disease. Fifty-three (16.4%) patients have others chronic illnesses.

DISCUSSION

The study revealed that the average completeness of clinical evaluation improved after implementation of EFS; however, it remains low and far from the expected level. There are several possible reasons that could explain this finding. The EFS was in the initial phase of implementation and the relative short consultation time.

Most patients with diabetes would eventually develop diabetic retinopathy (DR). Twenty-one million have DR with diabetic macular edema and 28 million with vision-threatening DR⁴. It is also considered as the leading cause of blindness among age-working adults⁵. In addition, it was found to be common even in patients with newly diagnosed diabetes^{6,7}. A study in Bahrain found that the prevalence of DR in the primary health care setting is 20.4%⁸. Several studies showed that following the annual screening and referral for ophthalmic evaluation is disappointingly low in family practice⁹⁻¹¹. Primary prevention remains the main task of primary care providers and the most effective weapon to combat this complication¹². Our study revealed that the periodic retinal examination that should be carried out once a year according to the guideline deteriorated from 80.0% to 50.0%.

Cardiovascular (CV) complications are by far the leading cause of death in both type 1 and type 2 diabetes. In addition, cardiovascular mortality is common and the rate increases if hyperglycemia is uncontrolled¹³. The study showed that ECG was done for only 9.6% of the patients attending the NCD clinic before the implementation of the EFS. It deteriorated even more after the implementation and reached to only 6%.

The national NCD survey conducted in Bahrain in 2007 showed a very high overall prevalence of most CV risk

factors. The overall prevalence of hypercholesterolemia was 40.6% and obesity 36.2%¹⁴. Control of CV risk factors remains suboptimal^{15,16}. A recent study revealed that significant improvement was found in the control of the studied CV risk factors in the same health center. However, control of hyperglycemia remains a challenge¹⁷. Seven CV risk factors are covered in the routine clinical assessment of patients attending NCD clinics: tobacco use, diet, physical activities, obesity, hypertension, diabetes mellitus, and hyperlipidemia. The completeness of all these risk factors (except tobacco use and physical activity) was high before the implementation of the EFS. Although the completeness of the other two risk factors (history of tobacco use and physical activities) was very low before the implementation, it improved significantly after and reached approximately 90%. In spite of that, the estimation of 10 years CV risk factors dropped significantly from 55.8% to as low as 8.3%.

The completeness of clinical evaluation carried out by the staff nurse was better than that by the physician. It further improved after the implementation of the EFS. One of the possible reasons could be that the staff nurse takes the general history, does some specific physical examinations and documents laboratory results. While the physician’s role is more towards the time-consuming patient management, including enhancing patient awareness of his illnesses, health education and prescribing medications.

CONCLUSION

The average completeness of clinical evaluation was low before the implementation of the EFS and remains low after. There are several possible causes, such as slowness/technical problems of the system and relatively short consultation time.

Further analytic multicentric study is required to identify the main underlying causes in order to plan and improve.

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