The Effectiveness of Holistic Diabetic Management between Siriraj Continuity of Care Clinic and Medical Out-Patient Department

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Background: *Diabetes mellitus is one of the most common diseases in the Thai population, and it is well known that diabetic complications could be prevented with appropriate management. Despite published guidelines, most Thai patients with diabetes do not achieve treatment goals. Siriraj Continuity of Care clinic (CC clinic) was recently established in order to provide training for medical students and internal medicine residents. It is possible that the training component in the CC clinic may contribute to better overall outcomes in type 2 diabetes mellitus (type 2 DM) patients when compared with usual care at the medical out-patient department (OPD).*

Objective: *To compare the effectiveness of diabetic management in type 2 diabetes mellitus patients who attended the CC clinic and the medical OPD.*

Material and Method: *Retrospective chart review was performed in type 2 diabetes mellitus patients who were treated at either clinic at Siriraj Hospital in 2007-2011. Baseline demographics, treatment strategies and outcomes, and participation in an appropriate health maintenance program were assessed in both groups.*

Results: *Seven hundred and fifty seven medical records were reviewed, including 383 patients in the CC clinic group and 374 in the OPD group. Mean HbA1c was significantly lower in the CC clinic group compared with the OPD group (7.3$\pm$0.9% and 7.8$\pm$1.3%, respectively, $p<0.001$). The number of patients who achieved goal HbA1c of less than 7% in CC clinic group was 123 (32.1%) compared with 91 (24.3%) in the OPD group ($p = 0.039$). More patients were screened for diabetic complications in the CC clinic group compared with the OPD group, including screening for diabetic neuropathy (57.4% vs. 2.1%, $p<0.001$), diabetic retinopathy (56.7% vs. 36.6%, $p<0.001$), and diabetic nephropathy (80.9% vs. 36.9%, $p<0.001$). Patients in the CC clinic group had a higher rate of age-appropriate cancer screening than those in the OPD group (54.2% vs. 13.3%, $p<0.001$ for breast cancer; 24.0% vs. 0.9%, $p<0.001$ for cervical cancer; and 23.0% vs. 7.4%, $p<0.001$ for colon cancer). Moreover, significantly more patients in the CC clinic group received recommended immunization (influenza, diphtheria tetanus and pneumococcal vaccine) compared with the control group ($p\leq0.001$).*

Conclusion: *Diabetic patients treated at the CC clinic had better clinical outcomes and healthcare maintenance compared with those who received usual care at the medical OPD. Continuity of care and integrated training component may have contributed to the improved outcomes.*

Keywords: *Effectiveness, Continuity of care clinic, Diabetes mellitus*

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Type 2 diabetes mellitus (T2DM) is a major public health challenge in Thailand. It is among the most common causes of morbidity and mortality in Thais, primarily as a result of its complications including cardiovascular disease, diabetic neuropathy, nephropathy and retinopathy[1]. Data from the Bureau of Non-Communicable Disease, Department of Disease Control (DDC), Thailand, demonstrated a constant increase in the prevalence of diagnosed diabetes patients in the Thai population. In 2010 there were more

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than 7,000 deaths due to diabetic complications. Up to 3.3% of diagnosed diabetes patients did not receive treatment, while only 28.5% of treated patients were able to achieve the recommended glycemic levels[1,2] as shown in Table 1[3]. For this reason, effective multidisciplinary management of type 2 diabetes has a crucial role in the Thai health care system.

The Continuity of Care clinic (CC clinic) at the Department of Medicine, Siriraj Hospital was established in 2006 and is currently operated by attending physicians who are general internal medicine specialists. The CC clinic is an integral part of training for both medical students and internal medicine residents, providing an emphasis on holistic management of patients with chronic illnesses, disease prevention, and health promotion, including cancer screening and standard immunization[4]. The CC clinic had greater amount of time spent with each patient, holistic approach including health education, lifestyle modification counseling, and psychological support.

Recent data show that continuity of care improves effectiveness of chronic illness management including T2DM, but previous studies have significant limitations including lack of a control group or the comparison was made only between clinics run by the Family Medicine Department and the Internal Medicine Department[5-8]. Studies comparing treatment effectiveness between internal medicine CC clinic system and the usual internal medicine out-patient department (OPD) system are lacking. A recent study showed that CC clinic was significantly more effective than the usual medical OPD, but the number of the patients reported on was relatively small[9]. The present study aims to compare the effectiveness of diabetic management between internal medicine CC clinic and usual internal medicine OPD using a more rigorous study design (case-control design), and including a larger number of patients.

Table 1. Target clinical practice guideline recommendations[3]

Recommendations	Target
HbA1c	<7%
Fasting blood sugar	90-130 mg/dl
Lipid profile	
LDL-C	<100 mg/dl
HDL-C	>40 mg/dl (male), >50 mg/dl (female)
Triglyceride	<150 mg/dl
Blood pressure	
Systolic blood pressure	<130 mmHg
Diastolic blood pressure	<80 mmHg

Material and Method

Subjects

A retrospective chart review was performed after the study protocol was approved by the Institutional Review Board (IRB). Comparison was made between 383 type 2 diabetic patients who were treated at the CC clinic and 374 patients treated at the internal medicine OPD at Siriraj Hospital between 2007-2011 in terms of baseline demographic data, glycemic control, screening for diabetic complications, and health maintenance. The authors excluded patients who were pregnant, those who were admitted to the hospital due to acute illness during the study period, those whose hypoglycemic agents were adjusted by other physicians outside of the clinic during the study period, and those whose available data were inadequate.

Processes

The following data were extracted from each of the medical records reviewed.

1. General demographic data including date of birth, date of first visit either at the CC clinic or at the medical out-patient department, weight, height, body mass index (BMI), co-morbid diseases, smoking status, alcoholic status and diabetic complications.

2. Laboratory results including HbA1c level, fasting plasma glucose (FPG), plasma LDL-C, and plasma triglyceride (TG), systolic blood pressure (SBP) and diastolic blood pressure (DBP) from each visit during the twelve months after enrollment.

Presence of diabetic complications including diabetic retinopathy (DR), diagnosed by ophthalmologist, diabetic nephropathy (DN), diagnosed by urine microalbumin-creatinine ratio $\geq$30 mg/g or urine protein-creatinine ratio $\geq$0.2 for 2 times or chronic kidney disease (CKD), diabetic neuropathy, diagnosed by abnormal monofilament test or vibration test using 128-Hz tuning fork or loss of pinprick sensation, cardiovascular disease (CVD), and cerebrovascular disease (CVA) were recorded. Severity of DR and DN was assessed using criteria defined by the American Diabetes Association (ADA)[3].

3. Data of diseases prevention, cancer screening and vaccine immunization were recorded.

Statistical analysis

The authors estimated that the primary outcome, HbA1c less than 7%, would occur in 60% in

the CC clinic group and 50% of the OPD group. Thus, an equally divided sample of 388 was deemed sufficient for the detection of differences, with a type I error (two-sided) of 5% and a power of at least 80%.

Continuous data were represented in form of means ± SD. The Chi-square and unpaired t-test were used to show the difference between two groups. All statistical analyses were performed with the use of PASW Statistics 18.0. For all analyses, a p-value of less than 0.05 was considered to be statistically significant.

Results

Subject characteristics

Clinical and laboratory characteristics of the subjects at baseline were shown in Table 2. Fifty-eight percent were female in both groups. The demographic data including age, sex, underlying diseases and medications were similar. In both groups, the most common co-morbidities were hypertension and dyslipidemia. Malignancy was significantly more prevalent in patients in the CC clinic group than those in the OPD group. The prevalence of diabetic complications and treatment according to study groups were shown in Table 3. Greater than 20% of both groups had been diagnosed with diabetic complications. Diabetic retinopathy was the most common diabetic complication in the CC clinic group as much as diabetic nephropathy (23.0% vs. 22.2%), whereas diabetic nephropathy was the most common diabetic complication in the OPD group (27.5%).

Diabetic neuropathy and retinopathy were significantly more common in the CC clinic group than the OPD group (9.7% vs. 2.9% and 23.0% vs. 12.3%, respectively) ($p<0.001$). On the other hand, diabetic nephropathy was more common in the OPD group (27.5% vs. 22.2%); however, the difference did not reach statistical significance ($p=0.089$). In terms of treatment of diabetes, participants in both groups reported similar use of medications including oral hypoglycemic drugs and insulin.

The HbA1c level before enrollment were similar in both groups (7.7±1.0% in the CC clinic group and 7.8±1.5% in the OPD group, $p = 0.280$) as shown in

Table 2. Baseline demographic data in the CC clinic and medical OPD patients

	CC clinic (n = 383)	OPD (n = 374)	p-value
Age (years)	64.8±13.0	65.7±13.3	0.347
Female (%)	225 (58.7)	215 (57.5)	0.725
Underlying diseases (%)	304 (79.4)	310 (82.9)	0.794
Hypertension (%)	233 (60.8)	246 (65.8)	0.425
Dyslipidemia (%)	169 (44.1)	172 (46.0)	0.629
Cancer (%)	41 (10.7)	17 (4.5)	0.001
Cerebrovascular disease* (%)	27 (7.0)	12 (3.2)	0.125
Cardiovascular disease** (%)	15 (3.9)	10 (2.7)	0.335
HbA1c level before enrollment	7.7±1.0	7.8±1.5	0.280

* transient ischemic attack or ischemic stroke, ** coronary artery disease or peripheral vascular disease

Table 3. Prevalence of diabetic complications and diabetes treatment in the CC clinic and medical OPD patients

	CC clinic (n = 383)	OPD (n = 374)	p-value
Diabetic complications			
Neuropathy (%)	37 (9.7)	11 (2.9)	<0.001
Retinopathy (%)	88 (23.0)	46 (12.3)	<0.001
Nephropathy (%)	85 (22.2)	103 (27.5)	0.089
Medications			
Insulin (%)	92 (24.0)	79 (21.1)	0.331
Sulfonylureas (%)	216 (56.4)	205 (54.8)	0.661
Metformin (%)	216 (56.4)	225 (60.2)	0.294
Alpha-glucosidase inhibitors (%)	17 (4.4)	20 (5.3)	0.573
Pioglitazone (%)	10 (2.6)	5 (1.3)	0.199

Table 2. After enrollment, participants in the two groups who were monitored by HbA1c more than 2 times per year were categorized by mean HbA1c into three groups as shown in Table 4. Mean HbA1c were significantly lower in the CC clinic group compared with the OPD group (7.3±0.9% and 7.8±1.3%, respectively, p<0.001). Significantly more patients in the CC clinic group achieved HbA1c of less than 7% (123, 32.1%) compared with 91 (24.3%) in the OPD group (p = 0.039). Regardless of the HbA1c, the mean of fasting plasma glucose was significantly lower in the CC clinic group (142.7±28.2 and 153.5±38.4, respectively, p<0.001).

Diabetic complications screening

The proportion of patients who were screened for diabetic complications was significantly greater in the CC clinic group compared with the OPD group, including screening for diabetic neuropathy (57.4% vs. 2.1%, p<0.001), diabetic retinopathy (56.7% vs. 36.6%, p<0.001), and diabetic nephropathy (80.9% vs. 36.9%, p<0.001). Screening electrocardiography (ECG) for cardiac hypertrophy, infarction or arrhythmia were performed more frequently in the CC clinic group than the OPD group (31.1% vs. 19.0%, p = 0.001) and the number of chest x-ray for detecting cardiomegaly in diabetes patients with hypertension or cardiovascular diseases were also greater in CC group than OPD group (25.8% vs. 16.6%, p = 0.007). The number of aspirin prescriptions for primary or secondary cardiovascular prevention was similar in both groups (93.0% vs. 92.5%, p = 0.807) as shown in Table 5.

Health maintenance program

The proportion of patients in the CC clinic group who received age-appropriate screening for breast, cervical, and colon cancer was significantly greater than that of the medical OPD group (all with p<0.001), as shown in Table 6. In the CC clinic group, breast cancer screening was performed in females 45 years or older, either by clinical breast examination or mammography, in 71 patients (54.2%) compared with 19 patients (13.3%) in the medical OPD group (p<0.001). For cervical cancer screening, 53 patients (24.0%) in the CC clinic group received Pap smear compared with 2 patients (0.9%) in OPD group (p<0.001). In terms of colorectal cancer screening among patients 50 years or older, either by fecal occult blood testing or colonoscopy, there were 77 patients (23.0%) in the CC clinic group who received screening compared with 25 patients (7.4%) in the OPD group (p<0.001).

Significantly more patients received recommended immunization in the CC clinic group compared with the OPD group, including diphtheria-Tetanus vaccine (24.0% vs. 1.1%, p<0.001), influenza vaccine (29.0% vs. 17.4%, p<0.001), and pneumococcal vaccine (7.0% vs. 2.1%, p<0.001).

Discussion

Previous studies have shown that diabetic patients need holistic approach to achieved the better glycemic control and prevent diabetic complications[5-8]. Our data are consistent with previous studies, which showed a significant improvement in glycemic control in patients after enrollment into the CC clinic compared with before enrollment[9]. Sriwijitkamol and colleagues in 2006[10,11] reported on outcomes of type 2 diabetes patients who were managed in the medical out-patient department at our institution. It was found that only 49% of the patients were able to achieve target HbA1c of less than 7.0%, and nearly 29% of patients had HbA1c of more than 8.0%. In our study, only 24.3% of diabetic patients in the OPD group achieved target HbA1c of less than 7.0% and 32.1% of diabetic patients in the CC clinic group achieved target HbA1c of less than 7.0%. This may partly reflect an overall ineffective diabetic control strategy in Thailand. However, the patients in our study were relatively old with a mean age of more than 60 years, thus poor glycemic control in this population may also reflect physicians' treatment decisions, opting for a less stringent glycemic goal in elderly patients who will receive little benefit for a strict glycemic control compared with a younger population.

The prevalence of diabetic complications was greater in the CC clinic group than the OPD group, which may reflect an increase in physician's awareness to screen for diabetes complications in the CC clinic rather than a more advanced diabetes disease in this group. This hypothesis is supported by the fact that significantly more patients from the CC clinic received assessment of diabetic complications including diabetic neuropathy, nephropathy and retinopathy. Also, 25.8% of patients in the CC clinic group received chest radiography whereas only 16.6% in the OPD group did, with similar findings for the use of ECG to screen for cardiovascular complications in both groups.

Our results showed that hypertension is the most common concomitant underlying disease in our diabetic population, which is consistent with results of the Inter ASIA study in 2003[12] which found that 67% of diagnosed diabetic patients had hypertension. The second most common co-morbidity in our population

Table 4. Mean HbA1c levels in the CC clinic and the OPD groups

Mean HbA1c level (%)	CC clinic (n = 383)	OPD (n = 374)	p-value
<7.00	123 (32.1)	91 (24.3)	0.039
7.00-7.99	198 (51.7)	144 (38.5)	0.026
≥8.00	62 (16.2)	139 (37.2)	<0.001

Table 5. Proportion of patients who received diabetic complications assessment and aspirin for prevention of cardiovascular diseases in the CC clinic and medical OPD patients

	CC clinic (n = 383)	OPD (n = 374)	p-value
Foot examination by monofilament (%)	220 (57.4)	8 (2.1)	<0.001
Eye examination (%)	217 (56.7)	137 (36.6)	<0.001
Creatinine (%)	374 (97.7)	357 (95.5)	0.097
Urine microalbumin or urine protein-creatinine ratio (%)	310 (80.9)	138 (36.9)	<0.001
ECG (%)	119 (31.1)	71 (19.0)	0.001
Chest x-ray (%)	99 (25.8)	62 (16.6)	0.007
Aspirin prophylaxis (%)	294/316 (93.0)	285/308 (92.5)	0.807
Primary prophylaxis (%)	264/286 (92.3)	267/290 (92.1)	0.914
Secondary prophylaxis (%)	30/30 (100)	18/18 (100)	1.000

Table 6. Proportion of patients who received age-appropriate cancer screening and immunization in the CC clinic and medical OPD patients

	CC clinic	OPD	p-value
Screening for malignancy			
Clinical breast examination* (%)	54/131 (41.2)	2/143 (1.4)	<0.001
Mammography* (%)	28/131 (21.4)	18/143 (12.6)	0.052
Clinical breast examination or mammography* (%)	71/131 (54.2)	19/143 (13.3)	<0.001
Pap smear** (%)	53/221 (24.0)	2/222 (0.9)	<0.001
Fecal occult blood test*** (%)	73/335 (21.8)	25/338 (7.4)	<0.001
Colonoscopy*** (%)	6/335 (1.8)	5/338 (1.5)	0.750
Fecal occult blood test or colonoscopy*** (%)	77/335 (23.0)	25/338 (7.4)	<0.001
Immunization			
Diphtheria-tetanus (%)	92/383 (24.0)	4/374 (1.1)	<0.001
Influenza (%)	111/383 (29.0)	65/374 (17.4)	<0.001
Pneumococcal (%)	27/383 (7.0)	8/374 (2.1)	0.001

* Female patients ≥45 years old, ** Female patients ≥21 years old, *** Patients ≥50 years old

is dyslipidemia, which asserts the fact that our diabetic population has a significantly greater cardiovascular risk than the general population.

Diabetes clinical practice guidelines recommended primary cardiovascular prevention with aspirin in diabetes patients who are more than 50 years old in male and more than 60 years old in female with at least one additional major risk factor. The number of patients who receive aspirin for primary or secondary prevention in the present study were high in both groups (>90%) and much higher than a previous study published in 2007[13]. In the present study,

Pongwecharak and colleagues showed that only 29% of diabetic patients in southern Thailand were prescribed aspirin for primary prophylaxis. Their trial collected data on 1,015 patients from the regional, community and teaching hospitals but our trial was performed at a single academic center, which may explain the discrepancy in aspirin use between these two studies.

The present study showed that more patients from the CC clinic received appropriate malignancy screening, including cervical cancer screening in women 21 years and over by annual Pap smear, colorectal cancer screening in patients 50 years and over with fecal occult blood test or colonoscopy, and breast cancer screening in women 45 years and over with either clinical breast examination or mammography. This increase in cancer screening rates may result in better long-term outcomes in the CC clinic group; however, a prospective long-term follow-up of these patients is required to answer this question. Adult immunization according to the WHO recommendation[4] were more frequently administered in the CC clinic group than in the OPD group. The follow-up period in the present study was too short to detect any effectiveness of immunization program.

Our data suggest an overall benefit of enrollment into the CC clinic in glycemic control, rate of screening for diabetes complications, malignancy screening, and other aspects of health maintenance such as immunization. The authors propose that continuity of care, the educational component of the CC clinic program, and the greater amount of time spent with each patient at the CC clinic may at least partly explain our observations.

Conclusion

The present study revealed a greater efficacy of continuity of care clinic, compared with usual care at the medical OPD, in the aspects of glycemic control, screening, and prevention of diabetic complications. While the demographic data and the treatment options such as medications in both clinics were similar, significantly more patients in the CC clinic group were able to achieve the glycemic goal compared with the OPD group. Moreover, more patients in the CC clinic group were screened for diabetic complications than the OPD group. These findings suggest that the continuity of care and holistic approach (including health education, lifestyle modification counseling, and psychological support) are important factors associated with treatment success in diabetic patients.

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Potential conflicts of interest

None.

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การศึกษาเปรียบเทียบประสิทธิผลในการดูแลผู้ป่วยโรคเบาหวานแบบองค์รวมในคลินิกดูแลสุขภาพต่อเนื่องกับแผนกผู้ป่วยนอกอายุรศาสตร์ โรงพยาบาลศิริราช

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ภูมิหลัง: โรคเบาหวานเป็นหนึ่งในโรคที่พบบ่อยที่สุดในประชากรไทย และการดูแลผู้ป่วยเบาหวานอย่างเหมาะสมสามารถลดการเกิดผลแทรกซ้อนจากโรคได้ ถึงแม้ว่าจะมีแนวทางปฏิบัติสำหรับการดูแลโรคเบาหวานแต่ผู้ป่วยไทยส่วนใหญ่ก็ยังคงไม่ได้รับการดูแลอย่างเหมาะสมได้ตามเป้าหมาย โรงพยาบาลศิริราชมีการจัดตั้งคลินิกดูแลสุขภาพต่อเนื่องขึ้นมาสำหรับการเรียนการสอนของนักศึกษาแพทย์และแพทย์ประจำบ้านอายุรศาสตร์ และคลินิกนี้อาจจะสามารถทำให้การรักษาผู้ป่วยโรคเบาหวานได้ผลลัพท์ที่ดีกว่าเมื่อเทียบกับการดูแลในแผนกผู้ป่วยนอกอายุรศาสตร์ซึ่งเน้นงานบริการ

วัตถุประสงค์: เพื่อศึกษาเปรียบเทียบประสิทธิภาพในการดูแลผู้ป่วยโรคเบาหวานชนิดที่ 2 ในคลินิกดูแลสุขภาพต่อเนื่องกับแผนกผู้ป่วยนอกอายุรศาสตร์

วัสดุและวิธีการ: เป็นการศึกษาแบบย้อนหลังโดยการทบทวนเวชระเบียนของผู้ป่วยโรคเบาหวานชนิดที่ 2 ที่มารับบริการที่คลินิกดูแลสุขภาพต่อเนื่องและแผนกผู้ป่วยนอกอายุรศาสตร์ของโรงพยาบาลศิริราช ในระหว่างปี พ.ศ. 2550 ถึงปี พ.ศ. 2554 โดยจะมีการเปรียบเทียบกันในด้านข้อมูลพื้นฐาน การรักษาโรคเบาหวาน ผลลัพท์ของการรักษา รวมถึงการตรวจคัดกรองและการป้องกันโรคของทั้งสองกลุ่ม

ผลการศึกษา: จากการทบทวนเวชระเบียนผู้ป่วยทั้งหมด 757 ราย โดยแบ่งเป็นผู้ป่วยที่ได้รับการดูแลที่คลินิกดูแลสุขภาพต่อเนื่องจำนวน 383 ราย และที่แผนกผู้ป่วยนอกอายุรศาสตร์จำนวน 374 ราย พบว่าค่าเฉลี่ยของระดับฮีโมโกลบินเอวันซีของผู้ป่วยในคลินิกดูแลสุขภาพต่อเนื่องต่ำกว่าผู้ป่วยในแผนกผู้ป่วยนอกอายุรศาสตร์โดยเท่ากับ 7.3±0.9 และ 7.8±1.3 เปอร์เซ็นต์ ตามลำดับ ($p<0.001$) และจำนวนผู้ป่วยในคลินิกดูแลสุขภาพต่อเนื่องที่มีระดับฮีโมโกลบินเอวันซีตามเป้าหมาย คือ น้อยกว่า 7 เปอร์เซ็นต์ เท่ากับ 123 ราย (ร้อยละ 32.1) ในขณะที่จำนวนผู้ป่วยในแผนกผู้ป่วยนอกอายุรศาสตร์ที่มีระดับฮีโมโกลบินเอวันซีตามเป้าหมาย เท่ากับ 91 ราย (ร้อยละ 24.3) ($p = 0.039$) สำหรับการตรวจคัดกรองภาวะแทรกซ้อนจากโรคเบาหวาน พบว่าผู้ป่วยที่มารับบริการที่คลินิกดูแลสุขภาพต่อเนื่องได้รับการตรวจมากกว่ากลุ่มที่มารับบริการที่แผนกผู้ป่วยอายุรศาสตร์ ได้แก่ การตรวจคัดกรองภาวะแทรกซ้อนทางระบบประสาทที่เท้าเท่ากับร้อยละ 57.4 และ 2.1 ตามลำดับ ($p<0.001$) การตรวจหาภาวะแทรกซ้อนทางตาเท่ากับร้อยละ 56.7 และ 36.6 ตามลำดับ ($p<0.001$) และการตรวจหาภาวะแทรกซ้อนทางไตเท่ากับร้อยละ 80.9 และ 36.9 ตามลำดับ ($p<0.001$) นอกจากนี้ยังพบว่าผู้ป่วยในคลินิกดูแลสุขภาพต่อเนื่องยังมีอัตราการตรวจคัดกรองโรคมะเร็งสูงกว่าผู้ป่วยในแผนกผู้ป่วยนอกอายุรศาสตร์ เช่น มีการตรวจคัดกรองโรคมะเร็งเต้านม

เท่ากับร้อยละ 54.2 และ 13.3 ตามลำดับ (p<0.001) โรคมะเร็งปากมดลูกเท่ากับร้อยละ 24.0 และ 0.9 ตามลำดับ (p<0.001) และโรคมะเร็งลำไส้ใหญ่เท่ากับร้อยละ 23.0 และ 7.4 ตามลำดับ (p<0.001) นอกจากนี้ผู้ป่วยกลุ่มที่มารับบริการที่คลินิกดูแลสุขภาพต่อเนื่องยังได้รับการฉีดวัคซีนป้องกันโรค เช่น ไข้หวัดใหญ่ คอตีบ บาดทะยัก และการติดเชื้อนิวโมคอคคัสมากกว่ากลุ่มที่มารับบริการที่แผนกผู้ป่วยนอกอายุรศาสตร์ (p≤0.001)

สรุป: *ผู้ป่วยโรคเบาหวานที่ได้รับการตรวจที่คลินิกดูแลสุขภาพต่อเนื่องมีผลของการรักษา การตรวจคัดกรอง และการป้องกันโรคอย่างมีประสิทธิภาพดีกว่ากลุ่มที่ได้รับการตรวจที่แผนกผู้ป่วยนอกอายุรศาสตร์ เนื่องจากเป็นคลินิกเพื่อการเรียนการสอน ซึ่งเน้นการดูแลรักษาตามแนวทางเวชปฏิบัติอย่างมีแบบแผน จึงมีส่วนทำให้ผลของการรักษาดีขึ้น*