The effect of processes measures of diabetes care and medication adherence on the developments of chronic diabetic complications

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Abstract

Background: Regular monitoring of glucose control and screening of diabetic complication and adherence to treatment are cornerstones for prevention of chronic diabetic complications. The aim of this study is to investigate the association between quality of diabetes care and the development of chronic diabetes complications.

Methods: This retrospective study was performed using the national health insurance claims database from the Health Insurance Review & Assessment Service (HIRA) of Korea. Study patients were aged 30 years or older, had type 2 diabetes, had taking at least one hypoglycemic agent in only one attending clinic at 2009, and had no history of any diabetes-related chronic complications including cardiovascular diseases before December, 2010, cancer, or hospitalization for $\geq$ 90 days (n=280,698). Patients who measured HbA1c and lipid profile at least once a year every year and had $\geq$ 80% of the possession rate of oral hypoglycemic medication every year from 2009 to 2014 were compared with those who didn't.

Results: The number of patients receiving 2 quality-of-care measures at least once a year increased to 52.5% in 2014 from 30.3% in 2009. Those having $\geq$ 80% of the medication adherence also increased from 60.3% to 73.5%. However, the patients who meet both conditions every year during study period were only 13,625 (4.9%). In them, the cumulative incidence of microvascular complications (nephropathy and retinopathy) was 4.1%, and that of macrovascular complications (myocardial and cerebral infarction and peripheral arterial disease) was 0.8%, (4.8% and 1.5%, respectively in those who didn't).

Conclusions: The proportion of patients who received 2 quality-of-care measures and had $\geq$ 80% of the medication possession rate every year are seriously low, but they experienced fewer diabetic macrovascular complications. This result provides support for the importance for enhancing the quality of diabetes care.

Table 1. Percentage of patients receiving HIRA recommended care processes and state prescribing OHA by audit year

	2009	2010	**2011**	2012	2013	2014
N	280,698	280,698	**279,295**	277,617	276,048	274,393
HbA1c measurement, more than once a year (N, [%])	147,911 (52.7)	143,212 (51.0)	**171,279 (61.3)**	179,382 (64.6)	185,967 (67.4)	191,868 (69.9)
Lipid measurement, more than once a year (N, [%])	91,329 (32.5)	91,722 (32.7)	**110,723 (39.6)**	119,631 (43.1)	126,988 (46.0)	149,417 (54.5)
HbA1c + Lipid (N, [%])*	84,119 (30.0)	85,482 (30.5)	**105,227 (37.7)**	114,411 (41.2)	122,350 (44.3)	144,110 (52.5)
Oral hypoglycemic agent possession ratio $\geq$ 80% (N, [%])	169,146 (60.3)	188,736 (67.2)	**194,501 (69.6)**	199,322 (71.8)	202,437 (73.3)	201,626 (73.5)
Good quality of care (N, [%])**	52,629 (18.8)	63,348 (22.6)	**79,149 (28.3)**	88,695 (32.0)	96,783 (35.1)	114,316 (41.7)

*Measured at least once a year, respectively; **HbA1c measurement, at least once a year + lipid measurement, at least once a year + OHA possession ratio $\geq$ 80%.

Table 2. Incidence of diabetic macrovascular and microvascular complications

|	2011	2012	2013	2014
Macrovascular complication (N, [%])				
Myocardial infarct	330 (0.12)	386 (0.14)	427 (0.15)	450 (0.16)
Cerebral infarct	535 (0.19)	516 (0.19)	585 (0.21)	646 (0.24)
Peripheral arterial disease	30 (0.01)	56 (0.02)	69 (0.02)	83 (0.03)
All macrovascular complications	890 (0.32)	948 (0.34)	1,073 (0.39)	1,166 (0.42)
Microvascular complication (N, [%])				
CKD, stage 3/4	203 (0.07)	510 (0.18)	817 (0.30)	1,066 (0.39)
CKD, stage 5	481 (0.17)	927 (0.33)	1,343 (0.49)	1,775 (0.65)
Replacement treatment	35 (0.01)	98 (0.04)	195 (0.07)	343 (0.13)
All CKD	639 (0.23)	1,321 (0.48)	1,981 (0.72)	2,595 (0.95)
Diabetic retinopathy	1,015 (0.36)	1,601 (0.58)	2,088 (0.76)	2,580 (0.94)
All microvascular complications	1,620 (0.58)	2,828 (1.02)	3,932 (1.42)	4,967 (1.81)
All chronic complication (N, [%])	2,516 (0.90)	3,758 (1.35)	4,967 (1.80)	6,075 (2.21)
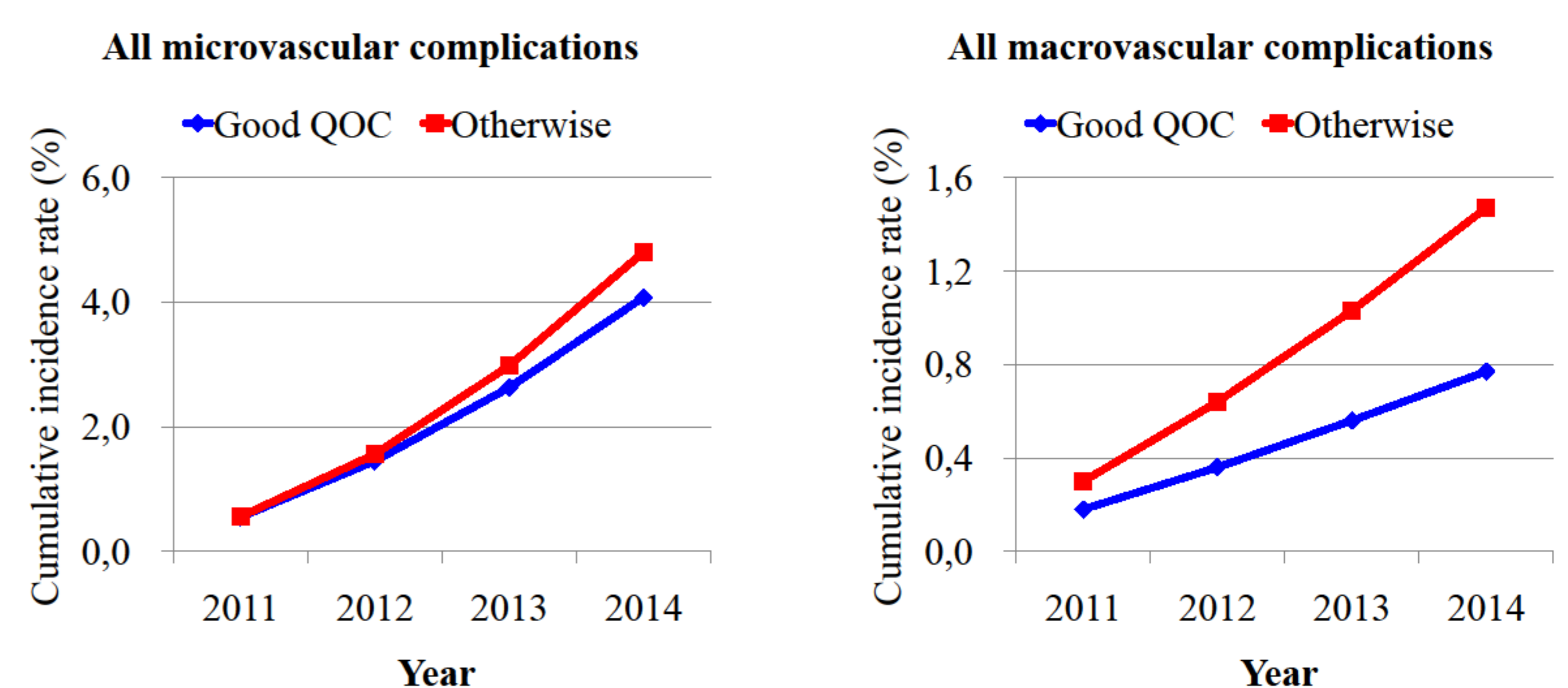
Figure 1. Cumulative incidence rate of diabetic complications between patients who had good quality of care (QOC) and those who didn't. A Good QOC was defined as measuring of HbA1c and lipid profile at least once a year every year and having $\geq$ 80% of the possession rate of oral hypoglycemic medication every year from 2009 to 2014.